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PUBLIC DOCUMENTS,

CONCERNING

THE OHIO CANALS,

WHICH ARE TO CONNECT

LAKE ERIE WITH THE OHIO RIVER.

COMPRISING

A COMPLETE OFFICIAL HISTORY

OF

THESE GREAT WORKS OF INTERNAL IMPROVEMENT.

COLUMBUS:

COMPILED AND PUBLISHED BY JOHN KILBOURN.

Olmsted, Bailhache & Camron, Printers.

1828.

ADVERTISEMENT.

The following collection of Documents relating to the Ohio Canals, was originally compiled for, and published in a weekly paper, entitled the *Civil Engineer and Herald of Internal Improvement*.—These documents were so important and of so immediately interesting a character, that it was deemed expedient to devote seven eighths, that is 14 pages of each number to them, until they should have been all inserted. This course was, accordingly adopted: so that but one leaf of two pages remained for the ordinary matter of the paper. An extra number of these papers was printed; and an appropriate title and index prefixed to these extra copies, and which are now bound in a volume by themselves. As it was found to be a tedious job for the bookbinder to cut off the first leaf, of two pages of each number, as was originally intended; they are left on, in most of the copies. But, as the contents of these extra pages relate, entirely, to works of public improvement, it is presumed that this circumstance will be no detriment to the main work. The documentary matter, as the reader will perceive, is continuous, immediately before and after each of these leaves.

PREFACE.

As the publisher of the present volume aims at no other merit than that of a faithful compiler of public documents; and as the introduction to a somewhat similar work descriptive of the New York Canals, published in 1821, by the late Charles G. Haines, Esq. is ably written; and is equally, and indeed is perfectly applicable to Ohio, the following extract therefrom, only substituting the word *Ohio* for *New York*, is here introduced, by way of preface.

The commencement, progress, and completion of the Ohio Canals, will hereafter constitute a subject of deep and anxious inquiry. Those vast and magnificent undertakings will be contemplated by future generations, among those monuments of public policy, that mark the genius of an age, and distinguish the spirit, enterprise, and capacity of a powerful people.— Nothing concerning them should be left to conjecture. When the facilities to perpetuate the memory of all important details, are so numerous as they are at present, neglect would deserve reproach.

It is a lasting censure on the age of Louis XIV. illustrious as it was for great writers, and when men of letters and genius condescended to give the intrigues of his courtiers, and to describe the manners and magnificence of his court, that the most authentic history of the Canal of Languedoc, which unites the two seas, was written in 1800, and that even this work is destitute of many important details connected with its subject. As to the Canals of China, intersecting each other, over the face of that immense empire, and opening communications between the greatest cities in the world, nothing is known of them which can essentially facilitate the enterprise of other nations in similar works; and we have no public documents that inform us of the beginning, advancement, and completion of the Canal of Russia, uniting the Caspian and the Baltic, and other waters of magnitude, although the story of minor and unimportant events, in the civil history of the north, has reached us in a circumstantial form. As to the histories of ancient improvements, for the extension of commerce, and the encouragement of agriculture, manufactures and the arts, they are lost in the oblivion of a thousand ages, while the solemnities of a feast, and the consecration of an idol, are embellished by the taste of the historian, emblazoned in the orations of the statesman, or breathed in the glowing numbers of epic song.

Public documents, like those now submitted in their present form, are the best sources of history. They come forth under the sanction of government. Their basis is facts. The principles and details which they exhibit are settled with caution, scrutiny, and with every advantage which pertains to investigation. Although the papers here published in a comprehensive and durable shape, will be followed by some others of a similar nature before the Ohio Canals are entirely completed: yet the elements of these works, the causes and reasons which induced their undertaking, and the policy upon which they rest, are here exhibited. The future reports of the Commissioners can be added to the present volume. They will only illustrate what has already been laid down. The collection of facts now embodied, will afford light and data to other states and other countries: they are facts too, which would ere long be scattered and lost, or only be preserved in the departments of state, and be procured with difficulty by the statesman, the political economist, the philosopher, and the historian.

Columbus, Nov. 1826.

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ERRATA.

Last line of page 143, for \$160 000, read \$160, 000. Page 272, seven-teenth line from bottom, for 17th Jan. 1827, read 17th Jan. 1828. Page 292, in the date of Report, for Jan. 5th, 1828, read Jan. 17th, 1828.

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED BY JOHN KILBOURN.

VOL. I.

COLUMBUS, OHIO, SATURDAY, JUNE 21, 1828.

NO. 1.

PROSPECTUS OF THE CIVIL ENGINEER AND

HERALD OF INTERNAL IMPROVEMENT.

The spirit of the present age is directed to the subject of Internal Improvements beyond that of any former period of time. A knowledge of Topography, and the science of Civil Engineering are necessary prerequisites to the judicious prosecution of this class of public works.

As no publication, of this kind, expressly devoted to this object, has yet appeared; and, as the science of Civil Engineering is becoming of great importance to mankind, both in a pecuniary and political point of view, it has been deemed expedient to commence a publication, especially devoted to this interesting subject; and to the promulgation of the progress, from time to time, of the most important Canals, Roads, Hydraulic works and Manufacturing Machinery in this and foreign countries, which may come to the knowledge of the Editor.

Other departments of the sciences, and the professions of Divinity, Law and Medicine have each, publications, specially devoted to their respective professions and pursuits. The profession of Civil Engineering, (for it is a profession, and rapidly rising into an important one,) should, most assuredly, have a periodical publication, especially designed to promulgate new discoveries and improvements, and the progress of works in this branch of human pursuit.

As the Ohio Canals are the present most prominent objects of interest to the people of Ohio; and as the principal circulation of the paper, at its commencement, will probably be within the limits of this state, the first numbers thereof are intended to be devoted principally to the History of these Works; until all the Official Documents, from the Governor's first Message relating thereto, the Acts of the Ohio Legislature, and all

the Engineers' and Commissioners' Reports respecting the same, from their earliest commencement, down to the present year inclusive, are all published in due order. This body of matter, together with occasional explanatory remarks, to connect these documents in an historical form, will constitute a tolerably complete History of the Canals; and will occupy probably from one third to half a year of the work, and bound by itself, would make a volume of about 400 pages. After that period, opportunity will be afforded for a more variegated body of matter, relating to the general scope and design of the publication.

TERMS.

THE CIVIL ENGINEER is proposed to be published at Columbus, (Ohio,) once a week, with a handsome type, on a large royal sheet, in an octavo form, each number containing 16 pages, of about the size and general appearance of that well known work, Niles' Weekly Register; and making two similar volumes every year of 416 pages each or 332 pages a year—Price, *four dollars* a year; but which may be discharged with *three dollars* in advance. It is contemplated to commence the publication within thirty days from this date. In the mean time, those of my fellow citizens, feeling friendly to the proposed undertaking, are respectfully requested to aid in obtaining for it an adequate support.

JOHN KILBOURN.

Columbus, May 26, 1828.

During the first six months of this publication, while it will be principally devoted to registering the public documents of past years, relating to the Ohio Canals, it has been deemed expedient, upon mature deliberation, to print the work in ordinary book-form, with only one column upon a page; excepting the first leaf of two pages. These two pages of each number will be occupied with brief, weekly notices of the current news of the times, relating to the progress and success of our Canals; and other works of public improvement.

After all the public documents, above alluded to, shall have been duly published in chre-

nological order, the work will then assume its originally intended form, of two columns on a page, and with increased room for a more ample account and detail of events, discoveries and improvements, relating to those matters which are the objects of this work.

It is recommended to subscribers to preserve the several numbers; as they will be regularly pagged, and a title page, and index is intended to accompany the last number of each volume; so that the successive volumes may be bound, and preserved as a work of reference for future years.

It has been deemed expedient uniformly to require advance payments unless in some special cases. This notice is given, that no disappointment, or misapprehension may ensue.

To a few individuals, to whom it is believed this publication would be acceptable; but who have not had an opportunity to subscribe: this work will be sent. Any such persons who would not wish to take it, will please signify the same by sending this number back again, by mail, directed to the "Herald" Columbus, Ohio.

OHIO CANALS.

To people out of Ohio, who are not conversant with the localities of this state, the following remarks will not, probably, be unacceptable. The main Erie and Ohio Canal, commences at Cleveland, on the lake shore, follows up the valley of the Cuyahoga river, southwardly above 30 miles, then crosses the Portage Summit, to the Tuscarawas or Muskingum river, whose valley it follows to Dresden, about 14 miles north of Zanesville; from thence it takes a southwestern direction across the height of land, dividing the Muskingum from the Scioto rivers, into the valley of the latter, about 12 miles south from Columbus; thence a southern direction along the valley of the Scioto river, passing Circleville, Chillicothe, and Piketon, to Portsmouth, on the north bank of the Ohio river, at the mouth of the Scioto. Total length 306 miles. Nearly two thirds of the whole is under contract; and about 40 miles, of the northern part, from Cleveland to Akron, is completed, and in successful operation.

The Miami Canal commences at Cincinnati, and extends northwardly along the valley of the Great Miami river; a total distance of 67 miles. It passes the towns of Hamilton, Middletown, Franklin and Miamiesburg to Dayton. This Canal is now finished, and in constant use from Cincinnati to Middletown, about 43 miles. The remaining 24 miles to Dayton, are to be completed in about three months.

A route was surveyed, some three years ago, for the future extension of this Canal, northwardly from Dayton, to the Maumee river at Fort Defiance; thence N. eastwardly, along the Maumee, to its mouth in the western extremity of Lake Erie. But this continuation of the Canal north from Dayton, (for a number of years hence,) has not entered into the Canal policy of the state. But, the late grant by

Congress, of some 300,000 acres of land, adjacent to this Canal line, on condition of its being immediately constructed through the Congress Lands, will probably induce the state of Ohio to prosecute its continuance, the ensuing year.

Baltimore and Ohio Rail-Road.

It is understood that this grand work of internal improvement, is to be commenced, on the 4th day of July next; the 52d anniversary of American Independence. A circumstance which will give peculiar interest to this event, is that the venerable Charles Carroll, the only surviving signer of the Declaration of Independence, is to take a conspicuous part in the public ceremonies of the occasion.

Columbus and Sandusky Turnpike.

This Road, which is to connect the seat of the Ohio state government, with the principal shipping port on the southern shore of Lake Erie, is now in successful progress. Owing to the excessive rains, during the past spring, it has been considerably retarded. But the several contractors are now prosecuting their work with increased vigour.

A public sale of the Lands granted by Congress to this Turnpike Company, will take place at Bucyrus, the seat of justice for Crawford county, on the line of the road, on Wednesday the 2d day of July next. These lands lie along the line of the road, are mostly of an excellent quality; and amount to 31,366 acres.

Cincinnati, Columbus, and Wooster Turnpike.

An act of incorporation was passed by the last Ohio Legislature, for a company to construct a Turnpike Road from Cincinnati, through Wilmington, Washington, Columbus, and Mt. Vernon, to Wooster: where it would unite with that already made from Wooster to Cleveland. A number of gentlemen named as Commissioners in said act, met last Monday, in this town, organized themselves, and directed books for subscription to said company, to be opened at the several towns above mentioned, and at a few other places.

The whole length of this turnpike is 190 miles.

By the late act of Congress granting Land to the state of Ohio, for the purpose of aiding the people thereof in the completion of their Canals, according to a hasty estimate thereof, the quantity amounts to about 334,000 acres. Of this quantity, 334,000 acres, or rather the avails thereof, are to be appropriated, exclusively, to extending the Miami Canal from Dayton to Lake Erie.—The alternate sections reserved by the general government, along the Miami canal, are not to be sold for less than \$2,50 per acre:—If we then estimate the value of the land granted to the state at the same price, then the whole value will be \$2,210,000 dollars.

It is stated, in a New York paper, of the 10th inst. that the amount of tolls received by the Canal Collector at Albany during the months of April and May last, was \$55,737.

PUBLIC DOCUMENTS
CONCERNING THE
OHIO CANALS.

Extract from Governor Brown's Inaugural Address, 14th December, 1818.

"If we would raise the character of our state by increasing industry and our resources it seems necessary to improve the internal communications, and open a cheaper way to market for the surplus produce of a large portion of our fertile country."

On the 7th January, 1819, Mr SILL, a member of the House of Representatives, from Ross county, moved the following resolution:

Resolved by the Senate and House of Representatives, That a committee consisting of five members on the part of the house, and ——— members on the part of the senate, be appointed to take into consideration, so much of the subject of internal improvement, as relates to the construction of a Canal connecting the waters that flow into Lake Erie, with those that flow into the Ohio river; that said committee be instructed to inquire into the expediency of authorizing the Governor to procure one or more skilful engineers for the purpose of exploring and ascertaining the most eligible routes for the foundation of said Canal, and that said committee report thereon by bill or otherwise.

Extract from Governor Brown's Message, 8th of January, 1819.

"You will bear in mind, that our productions which form our only great resource, are generally of that bulky and ponderous description, as to need every easement in conveyance, that we can afford. Experience is a faithful monitor; and the millions expended for transportation during the late war, may teach an useful lesson: another may be learnt from the present difference between the price of salt on the lake shore, and on the Ohio. I have already evinced an anxiety on this subject, excited by a strong sense of its vital importance. Roads and canals are veins and arteries to the body politic, that diffuse supplies, health, vigor and animation to the whole system; nor is this idea, of their extensive and beneficial influence new.

"The evidence in the old world is ample—in the United States sufficient. Massachusetts, Virginia, North and South Carolina, have proved the usefulness of artificial navigation. New York is making progress in a work in grandeur not surpassed by the achievements of art that connect by water, the North sea with the English channel; the Caspian with the Baltic; or the Mediterranean with the Bay of Biscay.

Nature strongly invites us to similar enterprise; the aspect of the face of this state announces capabilities for the grand object in question, exceeded, I presume, by few regions of the same extent: Yet with what exertions practicable, or how far within our means, cannot be ascertained without the assistance of an engineer. I appeal to each individual member who has

considered the bill introduced into the senate for incorporating a company to cut a canal, from Lake Erie to the Ohio, whether he have not felt a difficulty in deciding, from want of that information which a skilful survey could have furnished? Unwilling to act in the dark; yet fearful of discouraging a project so grand and magnificent, fraught with an influence upon our relations commercial and fiscal almost incalculable. Unconscious on the one hand what privileges the company might be justly entitled to as their reward—what other encouragement they might deserve—and what sacrifices public and private, justifiable, for completing a work so immense; yet sensible on the other hand, that the resources at present within your control, may be inadequate to the construction and formation of great commercial roads and extensive canals; and for the latter purpose dependent in a great degree upon individual enterprise and private capital.

Your acquaintance with mankind, and with the condition of the country, forbidding the expectation that individuals will embark an immense capital in an arduous undertaking and incur the risk and incident delay before their stock shall become productive; unless induced by the ultimate prospect of great advantages: The report of your engineer would relieve you from much hesitation.



By reference to the Journal of the House of Representatives, on the 4th day of February, 1819, it appears that a bill passed, in committee of the whole, to provide for the appointment of an engineer or engineers; but that the House, ultimately, postponed the same, until the following year.



—Extract from Governor Brown's Message, of the 7th December, 1819.

"Manufactories, in the Western States, are still too limited, in number and extent, to promise us a speedy relief and protection from foreign debt. It therefore remains for us, to avail ourselves, of the more common productions of the country. I hope for your indulgence, in pressing upon you, a subject of so great and general interest to the state. Your observation must have perceived, that one principal obstruction to the removal of the commercial distress, consists in the cost and difficulty of transporting to market those productions, which constitute our great and almost only resource, for regaining and preserving the balance of our trade. This difficulty once removed, our resources are ample. It now tends to exclude our provisions from competition, abroad, with those produced in situations, more favorable to easy and cheap conveyance: The effect upon industry and enterprise is too palpable to need comment. My conviction, of the usefulness of obtaining the information and estimates, which skill and experience can impart, of the practicability, and expence of forming canals, and opening the natural channels of internal navigation, through the state, induces me to request, that the measure recommended last season, of appointing a civil engineer, may again be considered."



Extract from the Journal of the House of Representatives, of the 14th Jan. 1820.

"MR KERR, [a representative from Ross county,] moved the following resolution:

"Resolved, That his Excellency the Governor, be requested to communicate to this house, such information as may be in his possession, which he may think proper to communicate, respecting the practicability of connecting the Ohio river and Lake Erie by a canal.

"Said resolution was agreed to by the house."

GOVERNOR'S MESSAGE,

In answer to the foregoing Resolution.

TO THE SPEAKER OF THE

HOUSE OF REPRESENTATIVES:

In compliance with the resolution of the House of Representatives of the 14th inst. requesting such information as I may possess, respecting the practicability of connecting the Ohio river with Lake Erie, by a canal, I respectfully submit the following observations:

It should be premised, that much of the following representations, ideas and opinions, being derived from casual observations, and various individuals, and but little from mathematical demonstration, the conclusions must partake of their uncertainty. I must, therefore, beg leave to refer to such members of the house, as are personally acquainted with the ground and the streams, to correct such misrepresentations as I have received, and here communicate, or erroneous opinions which I may advance.

It can scarcely be doubted, that a canal is practicable, through the north-eastern part of the state, and part of Pennsylvania: a swamp on the very summit, between the Mahoning branch of Beaver and Grand river, and whence, at some seasons, the waters flow in both directions, promises a permanent supply, for a canal of considerable length. At the famous portage between the Tuscarawas and Cuyahoga, both these rivers, it is believed may be made tributary to a water communication, over that portage which divides them; through the vallies of these streams, a canal is thought practicable. Of the height of the summits, on these two points, I have no information of tolerable accuracy, and of the other circumstances, which nature has interposed, to facilitate or impede a work, like that in question, on the east or the eastern route, my information is too limited, to authorize me to hazard an opinion. An accurate examination and survey of both, and an estimate of their respective cost, is within the scope of the policy of some permanence in this respect, which was recommended to the legislature, at this, and at the last session. It is feared, however, that the resources of the state, which can be called into action, for like purposes, will be insufficient for the completion of either in many years, without the aid I shall propose, in a subsequent part of this communication; but in the event of a failure of other means, the examination will afford data for the calculation of capitalists, who may be inclined to that kind of enterprise, under the patronage of the state. As, however, the examination and survey, cannot well proceed in every route at the same time, I conceive the public interest will be best promoted, by first examining the possibility of opening the proposed communication, through the late purchase within this state; and from its southern boundary to the Ohio river. I proceed to lay before you the best account I have been able to procure on the subject; regretting that those accounts are so deficient, in amount and precision, as to prevent me from indicating with assurance, the easiest and cheapest course for this important work; my reason for this preference, will be apparent in the course of these remarks.

It is understood that the dividing land in this territory, from whence the waters issue, to the Lake and the Ohio, appears to the eye, to be generally, and with little exception a dead flat; the streams, at some seasons scarcely seeming to flow in their channels: The surface of the country, on the north side, is represented as uncommonly smooth, for so great an extent; and declining towards the Lake, by degrees imperceptible to the casual observer; it remains for the scientific explorer to discriminate, and point out the most eligible course and direction, for the contemplated canal, through this region.

Descending towards the south, and including a considerable portion of the Miami country, it is well known, that the plain, (stretching from the dividing

line above alluded to, until it becomes bounded in that direction by the hills where Eagle creek, the Brush creeks and some branches of Paint creek, have their sources,) is remarkably uniform, and not diversified by a single hill of considerable magnitude. The declination is equally imperceptible to superficial observation, as on the north; and in one instance, by pursuing a line along the heads of Mad river, Little Miami and its eastern branches, it is said that the traveller may find a level so nearly uniform, from the source of the Scioto to the top of the Ohio hills, that scarce any appearance of hill or valley crosses his way, in the whole distance.

Three passes, across the highest land, have been mentioned as practicable; namely, one on the eastern part of the purchase, one near the head of the Scioto, and the third at the portage, between the Loromie branch of the Great Miami, and the St. Mary's. Mr William Steele, of Cincinnati, has obligingly furnished me with the result of a survey which he had caused to be taken at his own expence; by which it was found that from Lower Sandusky to the summit level between the waters of Sandusky and Scioto, the elevation is 450 feet.

In the report of the Secretary of the Treasury in April 1803, it will be found that the elevation of the Monongahela at Brownsville, above the tide water in the Potomac is estimated at more than 840 feet. This estimate may be considered as tolerably correct; and by making a reasonable allowance for the fall, from Brownsville to the mouth of the Scioto, it has been computed, that the Ohio, in the highest floods, is nearly on a level, at this point, with Lake Erie; making a rise and fall, between the two, of 900 feet.

After a general view of the face of the country, it has always been considered as one of the first and principal objects of enquiry, in a canal project, whether sufficient feeders can be commanded, especially on the summit level.

On the east side of the purchase before mentioned, the first grand reservoir that presents itself is a morass of about 16,000 acres, lying in the South Western part of the Connecticut Reserve, and contiguous to its Western boundary; whence several considerable streams issue into Huron and Sandusky rivers. One of the latter is divided from the Whetstone branch of the Scioto, by a swell of ground three miles broad, and in height, apparently, not very considerable. The same stream afterwards approaching within six miles of the East branch, or Little Scioto, is said to have been found by survey, to be exactly on a level with the latter, and separated from it by ground, where the deepest cutting to connect them, would not exceed sixteen, nor the average of deep cutting eight feet.

It has been represented to me, that further west, the principal branches of the Scioto, Great Miami and Auglaize rivers, take their rise in the same prairie; and that southwardly from thence a beautiful lake containing several hundred acres, situate on the Greenville boundary, discharges its waters into Mad river but which, with no great expence, could be made to flow to the northward. Several fine springs, in the vicinity of this sheet of water, (probably from that source) leave little or no doubt, that a canal could be amply supplied on the summit level, at this place; though perhaps not so abundantly as that on the eastern side, from the reservoir first mentioned.

Adverting next to the third point on the summit, I have only to remark, that my informants who have visited the spot, agree that the portage is over a flat piece of ground, when no inclination is visible, or can be readily detected by the draining of water from the level. I cannot venture to suggest how deep a cut would be necessary to connect the Loromies, fork with the St. Mary's, which are both represented as sluggish streams; and become low in dry seasons; I am not informed of any other feeders on this level; nor of any circumstances particularly encouraging or forbidding a canal by this passage;

except an estimate, without mathematical accuracy, for which I am indebted to Capt. Riley; who in coursing the Miami of the Lake and the St. Mary's, with an eye to water carriage, places the eminence at the portage, 1394 feet higher than the foot of the rapids; of which 1169 feet are below Fort Wayne on the head of the Miami. If the levels taken by direction of Mr Steele be correct, the above estimate must to all appearance be over-rated. Being unable, however, to say any thing particularly favorable of a canal in that direction, my further remarks must be confined to the practicability of a navigation passing over the two levels first indicated.

The head branches of the rivers, have in general, very gentle currents, as has been observed, and are nearly level with their banks; but in regard to the constancy of most of them, and the facility with which they can be diverted from their channels, to a canal (except as before described) my information is too limited and too little precise, to furnish data that can be relied on. But there seems no hazard in the general remark, that if the superior levels, in which the least and fewest obstacles are likely to occur, should be abandoned for the immediate vallies of the rivers, feeders in abundance can be commanded, from the main channels or the tributary streams.

A view of the map will enable the members of the house to discover, as much as I have in my power to disclose, concerning what points on the level of the Lake can be reached by canals with the greatest ease, from the two summit levels, particularly presented to their attention; reference always being had to the ground and to the supplies of water.

From the last mentioned passes over the summit, the southern aspect of the state presents several routes for canals apparently practicable. On the east of the Scioto river, the parallel course of the streams, and great uniformity of the land between them, seem to oppose to the undertaking, no very expensive deep cuts, aqueducts or embankments; provided that the canal can be fed above the immediate vallies of those streams. On the west of the Scioto, (keeping still in its neighborhood,) obstructions of this nature are more frequent and difficult to be surmounted or removed. Near Chillicothe, the hills approach near to the river; and it appears unavoidable that the canal must be brought into and continued in the river bottoms, till it shall reach the Ohio.

In contemplating an artificial navigation, through the country between the Miami's, it is thought that in the vallies of Mad river, (the feeders being copious) little more than excavation, and a few locks, of little lift, would be required. At one point, this river could, with ease, be diverted into Beaver creek, a branch of the Little Miami. I am not informed of the peculiar difficulties or facilities that would attend the work, in that direction to the Ohio; but by pursuing the course of Mad river to Dayton, at its mouth, and thence following the valley of the Great Miami, no very serious obstructions occur, till the hills below Franklin close upon the river. The exact nature of this impediment I am not well acquainted with; it is, however, far from being insuperable, though perhaps more costly than any one above it to the head of Mad river. Near Middletown, on the Great Miami, a choice would be left either to continue along the course of this river, or to turn the canal south, into the valley of Mill creek, towards Cincinnati. On the comparative ease of prosecuting the work on these two routes, as well as on the Scioto communication, in that part below Columbus, I forbear to comment; since these questions involve considerations, on which the Engineer must decide. The route above mentioned, along the level, east of the Little Miami would be preferable, under present appearances, so far as the ease and cheapness of a canal are concerned—but the dread of that formidable objection, the want of sufficient water in dry seasons, requires a critical examination, in this respect, before this passage be selected.

Considering that the navigation of the canal may require boats of a peculiar construction, it may possibly depend on the situation where either end of the canal shall terminate, whether it would be most desirable to overcome all the difference of elevation and descent by means of locks; or to communicate between its lowest levels, and the lake or river, by inclined planes, and other mechanical powers. It is possible that the latter expedient may prevent an unnecessary expence of water and current in the canal. and also save in the construction of locks, reckoned one of the most expensive parts of such an undertaking.

Where sufficient certainty for a correct topographical description is wanting, it will not be expected that a good geological account of the country, (which is a consideration of importance in such a project,) can be furnished. The transition of sand stone and lime stone is on a line, not very irregular, from near the mouth of Brush creek, to the mouth of Huron river; crossing the Scioto between Columbus and Chillicothe. If I am rightly informed, the limestone on the Sandusky is disposed in beds, intersected by cracks and fissures so frequent, that it is easily removed without the aid of gun-powder. The limestone on the south consists almost entirely of horizontal strata, of no great thickness. The sandstone may probably occur in large masses, but from its texture cannot be considered difficult of removal. Rocks of the description most dreaded by canal undertakers, are not likely to be encountered.

Though not within the scope of the inquiry that has been directed to me, yet it may not be impertinent incidentally to observe, that a transverse canal, fed from the waters of the Great Miami Scioto and Licking, might probably be extended from Greenville to Zanesville.

The second, though not less important consideration, embraced in the inquiry, is the means possessed, or in reach of the state, for the accomplishment of so magnificent a work.

It will readily be perceived that all conjectures and estimates on this subject, unassisted by a strict and scientific examination must be rather wild and unsatisfactory. Judging, however, from appearances, and the New York estimate of the cost of their grand canal, which experience has hitherto verified, we might be warranted in presuming two and an half millions of dollars, as the probable cost of the one, now the subject of your inquiry. But it is believed three millions would be a calculation perfectly safe for us, should our canal be equally large and deep with that in New York. As the ordinary resources of this state, for some time to come, will be insufficient for such a purpose, I will suggest, with much deference, a proposition to purchase of the United States, so much of the land, to which the Indian title has lately been extinguished in the northwestern part of the state, as lies southeast of the Miami river of the Lake; according to one of the following schemes, or with such modifications as the legislature may deem advisable.

The territory, thus proposed to be purchased, may be estimated to contain four millions of acres, exclusive of the Indian reservations, and of section No. 16, in each township. It might reasonably be expected, that where no aid is required directly from the Treasury of the General Government, Congress would be willing to extend assistance by a donation of lands, for a work, the accomplishment of which must be of such extensive benefit: but as preparations are making to offer the land for sale, and time does not admit of a protracted negotiation, it becomes necessary, if the contract is to be entered into, to make some definitive proposal, without dependence on the bounty of Congress. This bounty, however acceptable, may be withheld; and the following calculations have accordingly been made without reliance on their munificence.

Some of this land would unquestionably sell considerably higher, than the cash price of \$1 50 per acre, as proposed in Congress; but the length of time

that would be required to dispose of the whole, the risk of receivers, the expenses of sale, and other considerations, would over-balance that excess, and reduce the price upon fair computation, to one dollar per acre, payable in ten years, without interest and upon good security. This position excludes the ideas of extraordinary and unexpected contingencies, favorable to the sales; and of any extraordinary improvement like that now under investigation.

It would not be prudent to offer the land for sale, before the canal shall be ready for navigation; at which time, the most moderate calculator will hardly rate the land at less than three dollars per acre.

It is believed that the money for effecting the work can be borrowed on a pledge of the land, or the faith of the state. It will be unnecessary to borrow faster than the progress of the undertaking may demand: But to repay with ease, let us suppose the whole borrowed for seven years, at seven per cent. per annum: the account stated will be as follows:

4 millions of acres, at \$3 00 per acre,	\$12,000,000
Purchase money,	4,000,000
Cost of canal,	3,000,000
Interest,	1,470,000
Contingencies,	30,000

Requiring a sale of 2,333,333 acres to raise \$8,500,000

Leaving the state a balance of \$3,500,000 equal to 1,266,666 acres of land.

Admitting it possible that Congress should be insensible or unmindful of the great advantage the nation will derive, from this communication, in commerce, in war, in the sale of the public lands, and many other points of view in which it may be considered; let us suppose them to require the full price of six millions. The average term of time, in which they might hope to realize this sum, without interest, by the usual practice of selling, may be reckoned at fifteen years. Should the length of credit be still an objection, we may presume that Congress would extend the credit, on the whole, to ten years; and receive the six millions of dollars, in six annual instalments without interest: in which event, we should still retain a balance of half a million of dollars. In my calculations, I have presumed that the canal may be so far completed, as to admit of offering part of the land for sale in six years: it will then be necessary to raise a sum, probably not exceeding one million of dollars per annum, for ten successive years, to discharge the purchase money and the loan, with its interest. I request the house to observe, that the consequence of this navigation will be to fix an average value, immediately, on one million of acres, (in the most favorable situations) of ten dollars per acre—sufficient to clear the state of the whole debt; leaving the state in possession of three millions of acres, which at that time, (considering the increase of population and cultivation, and the convenient and ready market,) would be rated low, at five dollars per acre—enriching the state by a solid capital of fifteen millions of dollars; and by a superb canal, which, independent of the saving of half a million per annum in transportation, and numerous other advantages, would yield annually to the treasury, several hundred thousand dollars; the whole applicable to the extension of public improvements, of education, or any other useful purposes. There is room left by the foregoing computation, for the most extravagant allowances; even to the amount of five millions of dollars, and ten millions would still remain.

To obviate objections that may be raised to incurring so heavy a debt, under appearances, however plausible, an alternative may be proposed, that shall relieve the state of the whole burthen of the six millions of purchase

money, by making the United States interested in the formation of a canal. If the General Government can be assured of receiving its full price of six millions of dollars, for the four millions of acres, either by direct purchase in money, or by means of our exertion and enterprise, it may reasonably be expected that it will have no aversion to permit Ohio to make what profit it may, by the undertaking.

Pursuing the last valuation in the premises, as the ground of the present, let us examine how far it would be the interest of the United States to retain one third of the tract, in sections interspersed through the whole; designating the sections, thus reserved, by their numbers; and ceding the remaining two-thirds to the state of Ohio, on condition of completing the canal.

1,333,333 acres—price	\$6,000,000
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1,000,000 sold on completion of the canal at	
--	--

\$10 per acre.	
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One third to the United States,	\$3,333,338
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The remaining million reserved by the United States, worth five dollars per acre,	5,000,000
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	\$8,333,338
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Affording an additional inducement to Congress to close with these terms of	
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	\$2,383,333
--	-------------

Of the two thirds of the land ceded to this state, there would be equally required for sale, 666,666 acres, at \$10 per acre,	\$6,666,660
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Total expenses of canal, interest and contingencies,	5,000,000
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Immediate saving,	\$1,666,660
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Add to which 2,666,666 acres, \$5 per acre,	13,333,330
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	14,999,990
--	------------

Again relinquishing for the sake of absolute certainty,	4,999,990
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We gain, besides the canal and all its benefits, the im- mense sum of	
--	--

	\$10,000,000
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It may not be considered superfluous to remark, that a second canal may be found practicable, through the four millions of acres in question, in a different direction from the first. This effected, by an additional cost of four and an half millions of dollars, would nearly double the value of the whole tract; and afford additional millions for improvement, of every kind of internal communication, throughout the state, and for other useful and desirable objects; besides its more immediate advantage to thousands of our citizens, in the district through which it may pass.

It is unnecessary to multiply calculations or modifications, of which the foregoing propositions are susceptible, to demonstrate the practicability of connecting the Ohio river and Lake Erie, by a canal, by means advantageous to the United States and the state of Ohio. I am induced to coincide in the opinion, that has often been expressed, that there are few countries of equal extent with this state, where nature has so strongly invited, or has opposed so few obstructions, to this kind of improvement. I therefore recommend, that an examination of the country be instituted, and that an agent be appointed to negotiate a contract with the United States, on such terms as the legislature may prescribe.

It would too far transcend the limits of the inquiry, addressed to me by the house of representatives, to attempt an exposition of instances in which

the prosperity of the state would be advanced, by persevering with a steady eye to this grand branch of political economy. I cannot expect that they will fail to be sufficiently perceived and admitted—nor can I presume it necessary to appeal to your feelings of duty and patriotism by presenting, in alluring colors, the prospect of a rapid increase of the grandeur and prosperity of the state of Ohio, that would be derived from the adoption and pursuit of a policy, for which such grand resources seem to be placed within your reach.

ETHAN A. BROWN.

January 20, 1820.

Ordered, That two hundred copies of said communication be printed for the use of the members of both houses—and that the senate be informed thereof.

—♦—

Governor Brown's Message of the 11th February, 1820,—and Judge Holmes' Letter.

TO THE SPEAKER OF THE HOUSE OF REPRESENTATIVES:

In further answer to the inquiry, directed to me, by the house of representatives, concerning the practicability of a canal, between Lake Erie, and the Ohio river, I have the satisfaction to communicate, for the information of the house, a letter and a map, received, yesterday, from Alexander Holmes, Esq. This information is the more valuable, as the knowledge is derived from the personal observation of Mr Holmes, who was employed, during a considerable part of last year, in tracing and measuring the township lines, in the northwestern part of this state.

ETHAN A. BROWN.

February 11, 1820.

CHILLICOTHE, FEBRUARY 7, 1820.

ETHAN A. BROWN, ESQ. GOVERNOR OF THE STATE OF OHIO:

Dear Sir—In answer to your letter of the 31st ult. requesting information relative to the practicability of opening a canal through the tract of country lately purchased of the Indians in the northwest part of the state of Ohio, I herewith send you a plat of that tract, made from actual survey, on which all the principal streams are drawn, by which you see the approximity of the streams which flow into the lake, to those that run to the Ohio. As the greatest difficulty in opening a water communication, by canal, arises from want of sufficient feeders on the summit level, I shall first give you a description of the country and streams near that place.

The main branch of the Sandusky river approaches within six miles of the Whetstone and still nearer to the Little Scioto, the country between is all plain with an even surface, and but little elevation, what its height may be I will not pretend to make an estimate with any degree of certainty, but I feel confident that it is possible to get the main branch of Sandusky to the summit level without cutting more than fifteen feet deep.

Not having had any experience in works of this description, I shall not pretend to say whether those streams are sufficient for feeders at all seasons, but will describe them as I found them in the month of July last, which was a very dry season—either of the branches of the Sandusky, above the forks, had sufficient water running to drive one pair of large mill stones, turned by an under shot wheel, and the main branch had more than sufficient for that purpose; they are both rapid in their currents, and have a limestone bottom.

The Whetstone had not half the water that either of the other streams had neither is its current so rapid; near its source it passes over gravel and pebble stone. The Little Scioto is a very dead running stream, and in dry seasons has less water in it than the Whetstone.

The country, on either side of the Sandusky river, is level; after leaving its vicinity, a few miles on the east side there is a large swamp from which several streams flow into that river. I know of nothing to impede the continuation of a canal on that side to unite with the lake, at almost any point the legislature might wish to make.

I will further observe, that the information you have procured from different sources, as appears by your message to the legislature of Ohio, is generally correct, as far as I have had an opportunity of knowing any thing about it, except the estimate made by Capt. Riley. I have, also, travelled down that river, and should not make the estimate but little more than half so great. Any thing more that I could say relative to the streams through that country would only be a repetition of the information already obtained.

You wish me to give you a general description of that country—I shall briefly remark, the lands lying between the old boundary line, the Whetstone, Sandusky river and the Tyamochtee, is, with little exception, a plain country, with groves of excellent timber interspersed over it; its soil is of a good quality and very inviting to settlers. The lands between the Sankusky river and western line of the fire lands (commonly so called) are nearly all good and will admit of a dense population. The lands on all the principal streams west of the Sandusky, are generally of first quality for a short distance on each side; but on leaving the streams, a few miles, you fall into very wet lands, the greater part of which is inundated during the wet season. As the legislature are about to divide that tract into counties, great care should be taken so as to have some principal stream pass as near the centre of each county as possible, as the population for a number of years, will not leave the water courses to any considerable distance. You will see my plan of cutting that tract into counties, marked in pencil, on the plat, which can easily be rubbed off at pleasure, the largeness of some of them will be an objection; if they are made otherwise some of them will not be organized for a great many years.

I am respectfully,

Dear Sir,

Your obedient servant,

ALEXANDER HOLMES.

Extract from the Journal of the House of Representatives, of the 15th February, 1820.

“Mr Vance moved a resolution to request our Senators and Representatives in Congress, to use their exertions to procure grants of land for canal purposes, agreeably to the provisions contained in the act passed by this General Assembly, for making a navigable communication between Lake Erie and the Ohio river—which resolution was committed to a committee of the whole house, and made the order of to morrow.”

Wednesday, 23d February, 1820.

“Mr Corry from the joint committee of enrolment reported, that said committee had examined the enrolled bill entitled as follows:

“An act respecting a navigable communication between Lake Erie and the Ohio river.”

AN ACT,

Respecting a navigable communication between Lake Erie and the Ohio River.

Whereas, the effecting a navigable communication, by means of a canal or canals, between Lake Erie and the Ohio river, would greatly promote the agricultural, manufacturing and commercial interests of a number of our

sister states, of the union generally and of this state particularly. And whereas there is reason to believe that the Congress of the United States, as well from the above motives as from the advantage to be derived from the great appreciation of the public lands, through which such navigable communication might pass, would give liberal aid for effecting so desirable an object: Therefore,

Sec. 1. *Be it enacted by the General Assembly of the state of Ohio,* That there shall be appointed, by joint ballot of both houses, three commissioners for locating a route for a canal between Lake Erie and the Ohio river: *Provided,* It shall be located through the Congress land, in the late purchase from the Indians, in this state, making Columbus the present seat of Government a point as near as practicable; thence by the most eligible route to the Ohio river, keeping in view the greatest advantage resulting therefrom to the state.

Sec. 2. *Be it further enacted,* That it shall be the duty of said commissioners, or a majority of them, to employ a competent engineer and such assistants, chain carriers and laborers, as they may deem necessary, for the purpose of ascertaining, surveying and levelling the route of said canal, and allow them such compensation for their services as they may consider reasonable and just.

Sec. 3. *Be it further enacted,* That propositions shall be immediately made to the Congress of the United States for a donation and grant of land—the donation to be not less than two miles in breadth, on such route as may on examination, be found the most eligible for a canal, through that part of the lands of the United States, lately purchased of the Indians, which lies within the state of Ohio, and the grant to be not less than one million, nor exceeding two millions of acres, in the same tract of country and contiguous to the route for the canal aforesaid; the price of the lands purchased not to exceed one dollar and twenty five cents per acre, in case the donation aforesaid is made, or one dollar per acre, in case no donation is made—the first payment therefor, in either case, to be without interest, and not to become due until five years after the date of the grant or donation, and that the balance be payable in the same time thereafter as other lands are now paid for that are purchased of the United States: the donation and grant either to depend on the contingency that it shall be found practicable to construct a canal that shall be well supplied with water, and the expense thereof not exceed that which is now constructing in the state of New York per mile. That the route therefor shall be located within one year from the date of the act of Congress which shall authorize such donation or grant: and that the canal be completed so far as it shall pass through such donation or grant, within ten years from the time the location shall have been made; then it shall be the duty of said commissioners or a majority of them, as soon as may be, after the passage of such law of congress, to cause those parts of the territory of this state which may lie upon or contiguous to the probable course and range of the said canal, to be explored and examined for the purpose of fixing and determining upon the most proper and eligible route for the same, to make or cause to be made, with as much accuracy and minuteness as may be, calculations and estimates of the sum or sums of money which may or will be necessary for completing said canal, according to the plan which may be adopted and recommended by them for the construction and formation of the same: and cause the said calculations and estimates, and all surveys, maps, field books, plans, drafts and models, authorised and directed by this act, or so many thereof as may be completed, together with a plain and comprehensive report under and by virtue of this act to be presented to the legislature of this state, within twenty days after the commencement of the next regular annual session thereof.

Sec. 4. *Be it further enacted*, That if at the present session of Congress a law should be passed for appropriating a part of the lands through which said canal may pass, to aid in the construction of the same; the route designated by said commissioners from its commencement to the boundary line established by the treaty of Greenville, shall be considered as fixed and established, so far at least as not to be moved, without the limits of the land, which may be appropriated as aforesaid.

Sec. 5. *Be it further enacted*, That the state of Ohio, will accept of such conditions, in relation to the recession of the land, which may be granted for the purposes of said canal, by the United States, as the latter may think proper to prescribe, if the canal should not be commenced and progressed in, according to the terms of the cession.

Sec. 6. *And be it further enacted*, That the accounts for services rendered under this act, shall be settled by the auditor, and paid by the treasurer, upon the certificate of the commissioners or a majority of them, and the said commissioners shall each receive four dollars per day, as a compensation for their services.

JOSEPH RICHARDSON,

Speaker of the House of Representatives.

ALLEN TRIMBLE

Speaker of the Senate.

February 23, 1820.

Resolved by the General Assembly of the state of Ohio, That the senators and representatives in the Congress of the United States, from this state, be requested to use their influence in obtaining the passage of a law of Congress, at their present session, making a donation of, a grant, or right of pre-emption to purchase certain lands, agreeably to the provisions of 'An act respecting a navigable communication between Lake Erie and the Ohio river,' passed at the present session of this general assembly. That they also use their influence to obtain for this state, the right of pre-emption to purchase twelve sections of land, one in each of the counties laid off during the present session of this general assembly, and not yet organized, to be selected by commissioners to be appointed by the governor, in the case of the grant being obtained, for the purpose of establishing seats of justice thereon, in said counties. That they also use their influence to have the constituted authorities of the United States use their influence with the Indians, to permit the canal aforesaid being located and made through such of their lands, as may lie in the course thereof.

Resolved also, That the governor forward a copy of the act aforesaid and the foregoing resolution, to each of the senators and representatives in congress from this state: Also, one copy to the president of the senate, and another to the speaker of the house of Representatives of the United States: Also, one to the secretary of the treasury, and another to the commissioner of the general land office.

February 25, 1820.

Extract from Governor Brown's Message, of the 5th of December, 1820.

"The authority of the commissioners, to proceed in exploring and locating the route for a canal, under the act, 'Respecting a navigable communication between Lake Erie and the Ohio river,' having been made to depend on the accession of Congress to the proposition of our General Assembly, for a purchase of land, that service has not been undertaken. It is understood that Congress manifested, at their last session, an indisposition to make the proposed sale to this state; but that a bill passed the senate of the United States, for appointing commissioners to make the survey and estimates, as well as

for suspending the sale of certain lands; and that this bill remained among the unfinished business of the house of representatives. I cannot presume to foretel what will be its fate, in the latter branch. Should the General Government decline, and the legislature of Ohio deem so great an undertaking impolitic for the state, at present, there is reason to believe that capitalists would be willing to engage in the enterprise, under a liberal charter, if the practicability were previously ascertained. The great amount of unemployed capital in the eastern cities, the consequent depression of the rate of interest, and the low price of labor, and subsistence, are favorable to the execution of such a project.

"To commit such a work to the enterprise of a company, would be altogether preferable to its remaining unaccomplished; yet I must acknowledge my reluctance that the state of Ohio should forego the honor and revenue of the achievement, for which nature seems to offer so many facilities, and presents so few apparent obstacles, and for which, I conceive, resources are still attainable, without additional taxation."

Extract from the Journal of the House of Representatives, Dec. 8th, 1820.

"Mr Johnson moved the following resolution:

"*Resolved*, That a committee of four members be appointed on the part of this house, to act jointly with such committee as may be appointed by the senate, to take into consideration, so much of his excellency the Governor's message, as relates to a navigable communication, between the Lakes and Ohio river—with leave to report thereon by bill or otherwise.

"Said resolution was agreed to by the house.

"*Ordered*, That the same be sent to the senate with a message requesting their concurrence therein."

A message was received, the same day, announcing that the senate had agreed to said resolution, and had appointed a committee on their part. But this does not appear to have resulted in any thing of importance.

Extract from Governor Brown's Message, of the 4th of December, 1821.

"To effect the object of the act "respecting a canal, at the Falls of the river Ohio," I lost no time in making inquiries for a suitable character to perform the service contemplated, but without the desired success. My attention was principally directed to New York; where the successful progress of their famous canals, and the nice economy with which they are constructed, attest, at once, the superior science and judgment of their engineers, the enterprising wisdom of their councils, and the energy and prudence of those to whom the execution is entrusted. Owing to the liberality of the last appropriations, towards finishing those magnificent public works, no engineer in that employment could be spared last season. The grand western canal, in whose usefulness Ohio must soon participate—one of whose least advantages to New York is expected to be a yearly addition of millions to her revenue, now verges rapidly towards its completion; and in the hope that one of their engineers may be obtained, in the coming summer, whose reputation will be a guarantee for the fidelity and accuracy of his report, I respectfully recommend that his examinations be not confined to the Falls of the Ohio; but that provision be also made for employing him to ascertain, whether a water communication, between that river and Lake Erie, be practicable or not, and to estimate the cost of accomplishing so grand an object. When the length and expense of the engineer's journey, the possible relinquishment of other employment, and the necessary selection of a favorable opportunity are considered, there is reason to believe that the charges of a survey at the Falls

would make no inconsiderable part of his compensation, for the whole season. The knowledge that would be gained by his exploring the interior of the state would be useful, and always worth the cost; whether the state shall itself engage in improvement, after the great example of New York; or be desirous to know what reasonable incitement to afford to the enterprize of private capitalists."



Extract from the Journal of the House of Representatives, of the 3d of Jan. 1822.

Mr Williams, from the committee to whom was referred so much of the Governor's message as relates to canals, made the following Report—:

That the superior importance of improving the means of intercourse between different parts of a country, being a well established principle in political economy, it will not be necessary to adduce to the House the evidences of its illustration, which are afforded in the examples of the most illustrious countries of the old world, and in parts of our own; neither have they occasion, in the performance of their present duty to urge with the intelligent members of this body, the peculiar applicability of this doctrine to an agricultural state so remote from the sea as our own. It is a well established fact, that man has not yet devised a mode of conveyance so safe, easy and cheap, as canal navigation; and although the advantage of easy and expeditious transportation, is not likely to be perceived when prices are high and trade most profitable, yet the truth is familiar to every person of observation, that the enormous expense of land carriage has frequently consumed nearly, and sometimes quite, the whole price of provisions at the place of embarkation for a distant market. This is essentially the case in relation to all commodities of a cheap and bulky nature, most of which will not bear a land transportation many miles, and consequently are rendered of no value to the farmer, and are suffered to waste on his hands. The merchant who engages in the exportation of the produce of the country, finding it a losing commerce abandons it, or is ruined; and crops in the finest and most productive parts of the state, are left to waste on the fields that produce them, "or be distilled to poison and brutalize society."

The profits of agriculture and the reward of labor failing, industry must languish, and the train of evils must succeed, always consequent on such a state of things.

Impressed with these, and similar considerations, the committee have devoted much attention to that part of the message referred to them, and have collated many facts, such as their own personal knowledge, and the information others have furnished; from which they have drawn some prominent reasons, now submitted, which induce them to approve the recommendation of the Executive.

The obstruction at the falls is a impediment to the navigation of the Ohio river, during a great part of the year, that prevents the passage of steam boats and other vessels that navigate the Ohio and Mississippi; and in all that time renders the country above tributary to the town of Louisville, in a large amount, for expenses in passing that place, consisting of storage, commission and transportation. The injurious effect of the obstruction, in other respects, to trade of the upper country, is perceptible to any one, who has in the least attended to the nature of commercial operations, and in particular to the commerce through this channel. The state of Ohio was solicited by the rival canal companies at the falls, to aid their respective undertakings, and at the last session passed an act, one object of which expressly was, to ascertain to which canal it would be most prudent for the state to afford its countenance and assistance.

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

\$3, A YEAR.

PUBLISHED BY JOHN KILBOURN.

IN ADVANCE.

VOL. I.

COLUMBUS, OHIO, SATURDAY, JUNE 28, 1828.

NO. 2.

Pennsylvania Canals and Rail Roads.

The Philadelphia Press has furnished the following information concerning the works and improvements going on in Pennsylvania, as exhibited at the last meeting of the Canal Commissioners at Harrisburgh. It will be interesting to readers in our own state. Independently of the direct influence which the advancement of one section of the country exerts over that of others—it naturally, and from proper feeling, excites general gratification:

From Pittsburg up the Kiskeminetas to the Saltworks, 55 miles, will be finished, except the aqueducts, in a month.

From Saltworks to Blairsville, 30 miles, will be done by the 1st of Nov. There are two tunnels on this route.

From Middletown to the mouth of the Juniata, will be finished this season. 24 miles.

From the mouth of Juniata up the Juniata to Lewistown, 45 miles, in a state of great forwardness, will be navigable next summer.

From the mouth of Juniata to Northumberland, in a very forward state, will be navigable next summer. 41 miles.

From Bennis's Mill, on French Creek, to Conneaut Outlet, 9 miles are nearly completed. The remainder of the feeder will be contracted for as soon as possible, and urged rapidly to completion.

From Bristol, on the Delaware, to Taylor's ferry, 18 miles, the excavation is finished, with trifling exceptions; the aqueducts and culverts contracted for, and to be finished this season. Bridges and locks to be contracted for immediately. From Taylor's ferry to New Hope, 7 miles, is under contract, and to be completed by next spring.

Twenty-five miles on the North Branch, including a feeder from Nauticoke falls, to be contracted for early in July.

At the next meeting, the Board will probably take order on putting under contract the additional lines authorised by law, on the Juniata, Conemaugh, Susquehanna, and its branches, Delaware, and the Columbia Rail Road. As to the latter (Columbia Rail Road) no decision has been made upon the location. The subject was not before the Board at its late session, and will not be, until the surveys are completed. Of course nothing has been decided as to the Eastern termination.

The Secretary of Pennsylvania has advertised for a loan of \$1,000,000, for the Rail Roads and Canals of that state, on five per cent. stock: the interest to be paid semi-annually, at the Treasury of the state, or the Bank of Pennsylvania, at the option of the holder, and the principal at any time after Dec. 1, 1853, at the option of the state. The sum of \$860,000 will be required on the 10th of July next, and monthly instalments of

\$190,000, on the first of each month, from September to February next.

The board have adopted the most effective measures for the immediate completion of the locks at the Swatara, as well as of the whole line, thence to the mouth of the Juniata. The work at the upper end of the line has been unavoidably retarded by the usually high state of the river.

With this note, and a map of Pennsylvania before him, any one will be able to trace the several lines, and perceive the extent of the facilities to internal commerce, which will be afforded in the next eighteen months. There will then be more than five hundred miles of Canal in Pennsylvania, besides Rail Roads to the extent of upwards of one hundred and fifty miles.—*Eastern paper.*

Those readers of this paper, residing in this town, who may have the curiosity to trace the routes of any of these canals, or rail roads, can, by calling at this office, have the examination of a large and accurate map of Pennsylvania, for that purpose.

This map also embraces the greater part of Delaware and Maryland, as far south as the District of Columbia, all New Jersey, and part of New York, as far as the city: so that the route of the Chesapeake and Ohio canal can be traced; also the route of the Baltimore and Ohio rail road; the Chesapeake and Delaware canal; and the projected canal across New Jersey, to connect the Delaware and Raritan rivers.—*Editor.*

To some, the numerous detached recommendations, and other articles concerning the Ohio canals, commencing in the year 1818, and continued to this time; especially when no positive determination was made by the state, to prosecute these works, until 1825, may appear unimportant. But it must be recollected that this publication is designed as a work of reference, for future years; when it will be interesting to review the progressive steps, taken by the friends of the measure, to prepare the public mind to engage in such an Herculean undertaking, as our canals; by showing the benefits in various points of view, likely to result from its accomplishment, and the reasons consequent thereon, why we should embark in the enterprise.

In this view of the subject, the editor has hesitated, whether he ought not to have introduced more minute details of Legislative proceedings. In the view of some, perhaps it may be thought that too much detail is intro-

duced. A due medium has been sought, between these two extremes; and it is hoped, with a reasonable degree of success.

ABSTRACT

of "AN ACT, to aid the state of Ohio in extending the Miami canal from Dayton to Lake Erie, and to grant a quantity of land to said state to aid in the construction of the canals authorized by law."

Sec. 1. Provides that "a quantity of land, equal to one half of five sections in width, on each side of said canal, between Dayton and the Maumee river—so far as the same shall be located through the public land, and reserving each alternate section of the land unsold to the United States; and which land reserved to the United States, shall not be sold for less than two dollars and fifty cents per acre," shall be granted to the state of Ohio.

Sec. 2. "That so soon as the route of said canal shall be located,* it shall be the duty of the Governor, or other authorized person, to examine and ascertain the particular lands to which the said state will be entitled under this act, and report the same to the Secretary of the Treasury of the United States."

Sec. 3. "That the state of Ohio, shall have power to sell said land, and give a title in fee simple, after it shall have been so selected."

Sec. 5 & 6. That in addition to the foregoing land, there be granted 500,000 acres of land, "for the purpose of aiding the state of Ohio, in the payment of the debt, or the interest thereon, which has heretofore been, or which may hereafter be contracted by said state in the construction of the canals within the same, undertaken under the authority of the laws of said state now in force; or that may hereafter be enacted, for the extension of canals now making;" said selection is to be made by the Governor, or an agent appointed therefor, immediately, or during the present season.

The provision of both grants, is that all persons or property of the United States shall forever pass along said canals, free of toll.

A new invented Printing Press.

The Westchester Herald, printed at Mount Pleasant, about thirty miles from New York, is struck off on a Press invented by Mr Brady. It is asserted, that it will throw off one thousand impressions an hour, is simple in its construction, and will do good work. The machine will cost about \$250, and may easily be worked by a man and two boys. The profession are invited by Mr Brady to inspect the machine, and he tenders his services to all who approve of his invention, and wish to procure one or more of them, which will be made in a substantial manner of cast iron frames, for the above named price. The inking apparatus of this machine, may be readily attached to common lever or screw presses, and used by means of a treadle, thereby dispensing with the labor of one person.

If this press will perform as stated by the inventor, we should advise him to come to New York at once. He will find no difficulty in making arrangements to build a number in a

short time and get them into general use. In point of cheapness it has a great advantage even over the old fashioned common hand press, and indeed over any other that we have ever seen. The Boston Treadwell press costs \$2000—the Napier 4 or \$5000, and then they do not perform as well as could be wished. They are far from being perfect machines. The former gives the impression by a perpendicular motion. The platin is brought in contact with the form much as the Smith and Rust press, which in our opinion is the only true method by which you can get a neat impression. The latter does its office by passing the sheet around a cylinder over the form of types with great rapidity.—*N. Y. Post.*

From New Brunswick.—We have received the various papers of this Province to the 1st inst.

The contemplated canal, to connect the waters of the Bay of Fundy with those of the St. Lawrence, creates some discussion. Sir H. Douglass has written to the Government of England, urging some immediate preparatory measures. Representations have also been made from the other British Provinces showing that such a work would be of important advantage to them. The probable cost of the canal is estimated at £100,000. It is stated the transit trade must be very extensive through the canal, not only for consumption in New Brunswick: but for warehousing, during the winter, for exportation to the West Indies, as the Canadas and Prince Edward Island, during a portion of the year, are laid under great disabilities by frost.

Boston Traveller.

SAVANNAH, June 5.

The Thermometer yesterday at 1 o'clock, stood at 92 within doors, 100 in open air in the shade, 125 exposed to the sun.

Chesapeake and Ohio Canal.

A general meeting of the Stockholders was held in the City Hall in this City yesterday, for the purpose of electing a President and six Directors, to manage the concerns of the Company for the ensuing year; when the following persons were chosen:

PRESIDENT.

CHARLES FENTON MERCER, of Virginia.

DIRECTORS.

JOSEPH KENT, of Maryland.

ANDREW STEWART, of Pennsylvania.

WALTER SMITH, of Georgetown.

PHINEAS JANNEY, of Alexandria.

FREDERICK MAY, } of Washington,

PETER LENOX. }

National Journal of the 21st June.

The reader will observe that the regular series of Canal Documents, will occupy, for several months, all this work; excepting the two first pages. In the present number, the article, left unfinished, on the 16th page, is continued on the 19th page of this number; and they will be similarly continued on the third pages of the succeeding numbers, until they have been all inserted.

* It was located in the year 1824.—*Editor.*

From this step the committee conceive there will be no disposition in the General Assembly to recede, if they give due consideration to the honor and interests of the state. The compensation of the Engineer will form the principal item of expense in this examination, as well as that proposed in the message, and that compensation for the whole season's services would not greatly exceed the cost of a survey and estimate at the falls alone—it therefore is in the opinion of the committee, peculiarly desirable, that an examination into the practicability of a navigable communication between Lake Erie and the Ohio river, should be made by the same Engineer, whose compensation for both services would not greatly exceed that for the first alone. A navigable communication across the state, your committee believe, is not forbidden by any natural and insuperable obstacle, but on the contrary, they consider appearances and natural facilities to be highly favorable and inviting.

The committee are not disposed to slight the judgment of those persons who apprehend that feeders cannot be obtained for the summit level between the waters that flow into Lake Erie and the river Ohio, though they consider the apprehensions to be without sufficient foundation. They conceive there exists so strong a probability of an adequate supply of water for that elevation, as to warrant the General Assembly in calling for a decision of the question by a competent judge in such matters; and the committee are induced to urge this decision, because, should they be mistaken in their views in this particular, the sooner that fact is satisfactorily ascertained, the better for the interest of the state—for while its practicability remains probable, the influence of public feeling will not suffer the project to be abandoned, and the time and money annually consumed in legislative attempts to get an examination and survey, will soon exceed the cost which will be required in making the necessary examination to settle the question. There is, therefore, every inducement for this General Assembly, to authorize the proposed survey and estimate, as it will cost the state less to authorize it now, than to delay it longer. The committee would refer those who apprehend a deficiency of water at the summit level for feeders, to the letter of Alexander Holmes, Esq. to Governor Brown, bearing date 7th Feb. 1820, who surveyed the lands at the sources of the Sandusky and Whetstone, in the summer of 1819. [See Journal H. R. 1819—20 p. 344.] He says, "I feel confident that it is possible to get the main branch of Sandusky to the summit level without cutting more than fifteen feet deep. Not having had any experience in works of this description, I shall not pretend to say whether those streams are sufficient for feeders at all seasons, but will describe them as I found them in the month of July last, which was a very dry season—either of the branches of Sandusky, above the forks, had sufficient water running to drive one pair of large mill stones, turned by an undershot wheel—and the main branch had more than sufficient for that purpose: they are both rapid in their currents, and have a lime stone bottom." Again he says "the country, on either side of the Sandusky river, is level; after leaving its vicinity, a few miles on the east side there is a large swamp from which several streams flow into that river." From information the committee have been enabled to obtain from gentlemen who have made personal examinations, and on whom they can rely, similar facilities are to be found further to the east on the same summit level, between the head waters of the Muskingum and the Black river.

Having premised thus much, three principal views present themselves to the minds of the committee, in which this highly momentous object ought to be considered, in order to form an opinion whether it would be expedient that the state should concur with the repeated recommendations of our Governor, by setting on foot a scientific inquiry into the practicability of uniting the waters before mentioned, for the purposes of commerce, and into the difficulties, facilities and cost that would attend so noble an enterprise, namely, the probable expense, profits and means.

In the absence of the necessary information from which, with any degree of certainty, to estimate the cost of the proposed water communication, the most that can be expected of the committee, on this part of the subject, is, to compare the topographical appearance of our state with that region of the state of New York over which their Grand Western Canal passes, and to assume as data of calculation, the average cost of that work, so far as it is completed, making reference to the difference in the character of the country. No extraordinary difficulties in excavation, such as they have surmounted, are we menaced with, nor with very expensive deep cutting and costly embankment—with being forced, like them, to penetrate for miles through deep beds of solid rock, and to erect stupendous aqueducts, the lasting monuments of her combined wisdom, art and enterprise. The actual expenditure, so far as they have proceeded in New York, does not equal their original estimate, and they expect the Erie Canal to be completed for five millions of dollars. The comparative view our limited acquaintance with the subject enables us to take, seems to warrant our strong belief that the enterprise may be achieved in our state for two fifths, or at most, one half that sum. If this amount be not so great that it ought to deter from attempting the work, (should it prove practicable) as the committee will endeavor to shew in the proper place it is not, the proposed investigation will be no idle experiment, but will rather afford evidence of the enterprising zeal of the present General Assembly, for the internal improvement, and agricultural advancement of the state, whose future destiny is committed to their charge.

The next consideration that has attracted the attention of your committee, is the profits to result from the canal. These naturally divide themselves into two heads, namely, the profits to the owners of produce and merchandise by cheapening and facilitating transportation, and those in the light of revenue. Though no contradiction of the premises assumed in the first part of the report is apprehended, it may be excusable to enforce the arguments in favor of the recommendation by calling the attention of the House to some of the particular advantages that may be realized, especially by the agricultural interests, should the contemplated improvement be made. It would operate as another artery in the body politic, not merely beneficial to its neighborhood, but diffusing wealth, activity and vigor to the whole, and it will be allowed us to predict, that if it were once completed, the inhabitants of Ohio would witness its annihilation with as much regret as that of the noble river, or the beautiful lake, whose waters wash so large a portion of our borders. So long as the produce of our farms shall constitute our staple articles of trade, the market of New York, from its capital, tonnage, commercial situation and climate, will continue preferable to that of New Orleans; and with the aid of the artificial navigation in question, the valley of the Ohio from Pittsburgh to the falls can realize a sale of its exports much sooner, and the transportation will cost much less, and be attended with less risk, than if a market were sought through the Mississippi. All parts of the western country have felt, and still feel the destructive effects of that climate on our provisions; the experience and observation of all who have been in that trade, can testify to the deleterious influence of the climate on our boatmen and traders and the sacrifice of life and health at which that commerce is prosecuted.

An adventurer arriving at New Orleans, in the spring with a cargo of flour, &c. most frequently finds the market overstocked, especially at that season of the year which admits him to descend from the country above the Falls. To leave his property is to abandon it to destruction—to wait for a higher price is to incur the dangers of an unwholesome climate. He must ship his flour or sell at a sacrifice—oftentimes at a price that will not pay freight and charges. It is fair therefore to compare the delay, cost and risque of sending

the cargo from the Ohio to some port beyond the Gulf of Mexico, with the time, charges and risque that will be incurred in transporting it to New York by the projected canal. And to compare a voyage to New Orleans, by a circuitous and dangerous navigation, through more than ten degrees of latitude, approaching the torrid zone, exposed to all the deleterious effects of the climate on the constitutions of persons from a northern latitude, with a safe and expeditious voyage through the heart of our state and that of our sister state, in a healthful climate, and supplied with all the necessaries and comforts which a thickly settled and highly improved country will afford. In the first case the difference in time will be several weeks, and in cost at least equal to the charges of shipping the cargo from New Orleans to some Atlantic port; and in the second case, equal to the difference between an unhealthy climate—dangerous navigation and a tedious voyage in returning of sixteen hundred miles against the current of the Mississippi and Ohio—and a healthful climate, safe, expeditious and easy voyage both going and returning.

The views of your committee may be further illustrated by the following exposition, which will apply to all the commerce that would pass the Falls of Ohio for New Orleans if no other channel for exportation should be opened. At the time of the late rise in the price of flour it was worth at Cincinnati \$3 50 per bbl., and at the same time was worth \$8 00 in New York, and was purchased at each of these markets for the then expected demand in England. The cost of transporting a barrel of flour from the former to the latter market through the contemplated canal, is estimated at \$1 70 which added to \$3 50 the cost at Cincinnati, would make \$5 20 the cost at New York. Deduct this sum from \$8 00 the value at the latter market, and there is left \$2 80 the increase in value of a barrel of flour at Cincinnati, produced by the facility of transportation afforded by the proposed canal. The committee find there was inspected at Cincinnati for exportation in the season of 1818—19, as appears by the return of the inspector of Hamilton county, 130,000 barrels of flour, which at the enhanced value of \$2 80 per barrel as above shewn, would make \$364,000 the increase in the value of that quantity of flour, which would be fairly attributable to the increased facility of transportation to that market. Thus,

Transportation of bbl. flour through the Ohio canal		
at \$2 00 per ton		20 cents
Toll through do. at \$3 00 per ton		30
Transportation across the Lake		20
do. and tolls New York canal		80
do. from Albany to New York		20
		<hr/>
		\$1 70
Cost at Cincinnati		3 50
		<hr/>
		\$5 20

which deduct from \$8 00 the price at New York, will leave \$2 80, which on 130,000 barrels would give \$364,000 profit to the farmers of the Miami country on one year's crop of wheat. It may be supposed by some that this calculation is extravagant and visionary, which, however, if investigated, it is believed will not appear entirely so. But to remove such impressions, should any exist, deduct the \$64,000 to cover any error that may exist in the principal assumed; or, if it be thought necessary, deduct 164,000 dollars from the result, and there will still remain 200,000 dollars profit, or increase of value on one year's crop of wheat in that small section of our state. If this estimate of the increased value of the agricultural products of this section of our state, have any foundation, and your committee believe it has, the

principal assumed will apply equally, if not more forcibly to other parts of the state. The committee assumed this point from which to make an estimate, because it was the only point at which they could obtain any thing like certain data from which to reason, knowing that the principal here assumed would apply equally to other parts of the state.

By way of further illustration it has been estimated by the committee, that the county of Pickaway grows 400,000 bushels of wheat annually. This would make 80,000 barrels of flour, which, estimating 10 barrels to the ton, would make 8,000 tons for transportation. Suppose the canal to pass through this county—at \$3 00 per ton, freight and tolls, the transportation of 8,000 tons would amount to 24,000 dollars—the same transported to the Lake by land would cost at least 25 dollars per ton, and would amount to 200,000 dollars; shewing a difference between the two modes of transportation, in favor of the former, of 176,000 dollars to one county through which the canal passed, in the single article of flour. Suppose ten counties on the line of the canal, each producing an equal quantity of flour, and there are that number from the mouth of the Scioto to Sandusky bay, which will produce an equal amount so soon as access can be had to a steady market, and the result will be upward of a million and a half of dollars increase in the value of the flour which these ten counties would annually produce, if there was a sufficient incentive to the industry of the farmer. If this be correct as to flour, it is equally so as to every other article which these counties would produce for exportation. And from what has been shewn relative to the risk and uncertainty of the New Orleans trade, which will apply with increased force to the country in the interior of our state, it is very evident that the exports from this section of country, will not seek a southern market while they can find their way at less cost and risk, direct to an Atlantic market, at all times a safer one.

Although the members of this committee have on other occasions, heard much of sectional jealousies, they have lent an unwilling ear to the degrading sentiment; and consider it would be highly derogatory to any part of the state to suspect they would be envious of an immense benefit to a portion of their fellow citizens, procured without expence to themselves, by an operation which cannot fail to enrich the whole community, and place at their disposal most ample resources for education, and for every kind of internal improvements.

Your committee in their inquiries on this part of the subject, have not been unmindful of the manufacturing interests, which in some parts of Europe are thought to receive at least equal benefit with agriculture, from this species of improvement. It is conceived that the advantage of both, from the execution of the project, may be blended in many particulars, and that they may thereby be rendered mutually subservient to each other, and to the best interests of our country.

The probable productiveness of the canal as a source of revenue, comes next to be considered. The committee feel every reasonable confidence in representing that the accomplishment of the noble scheme would more richly reward the undertaking than any other enterprise which the country could promise to the most sanguine adventurer. Computing at the rate of one cent per ton per mile. (the rate established on the New York canal) for the actual expence of canal transportation, the toll that the commodities so transported, will bear, will be very great; the committee are, however, content to limit it to one and a half cents per ton, per mile, (the rates of toll established on the New York canal) or in other words, the freight and toll on a ton conveyed the whole length of the canal, would be five dollars—two dollars per ton for transportation, and three dollars per ton for tolls.

The committee have found it very difficult to procure the necessary data, from which they could make satisfactory estimates of the revenues which would be derived from the proposed canal; but from the most satisfactory means of forming an estimate which they have been enabled to procure, which though not to be relied upon with certainty, they think entitled to consideration, it is believed the revenues would be, independent of any motive of a higher nature, a sufficient inducement to the state to undertake this highly important work.

It has been estimated by the committee, in part from official data, and from sources of information less to be relied on, that in the year 1818—19 there was shipped from Cincinnati and out of the two Miami rivers about 50,000 tons of commodities for a foreign market, the principal part of which it is believed would have found its way to the New York and Montreal markets, if a water transportation could have been had direct to those points. It has also been supposed by the committee that an equal amount would pass through the proposed canal annually from that part of Kentucky which lies above the Falls of Ohio—from that part of Indiana which lies above the Falls, and from the parts of Virginia and Pennsylvania which border on the river Ohio, an equal amount; and from that part of the state of Ohio bordering on the river which lies above the Little Miami, an equal amount, making a total thus estimated of 200,000 tons. If these estimates have any foundation, and the committee are of opinion they do not exceed the probable amount, the result will shew the probable amount of commodities which would pass through the proposed canal annually. This amount will increase as the population and improvement of the western country advances, and as the demand for the produce of our country increases. Estimating the tolls at three dollars per ton, as above shewn, the result will be, a revenue to the owners of the canal stock of 600,000 annually. It may be said this estimate of the amount of transportation through the canal is too great. If so, reduce it one half, allowing only 25,000 tons from each of the divisions, making a total of 100,000 tons, which your committee feel confident is not an over estimate, and the result will be a revenue of 300,000 dollars annually. In order to strengthen these estimates if it be thought necessary, the committee beg leave to call the attention of the house to other sources of transportation. The estimates so far have had reference to the exports of the country only. It is believed that most of the foreign goods and articles imported for the consumption of the states of Ohio, Kentucky, Indiana, Illinois and Missouri would be purchased at New York and transported through the Ohio canal, which would aid very materially in making good the foregoing estimates.

When the extent of country thus to be supplied with merchandize is taken into view, and when it is recollected that the city of New York will hold forth greater inducements and facilities to the western merchant than any other mart to which the western country can have access; and more especially so when it is recollected that a great proportion of the exports of the western country east of the Falls of Ohio, and some even west of that, will find a market at that city; and that the safety, certainty and cheapness of transportation from that city to the Ohio river, will be such as to hold forth every inducement to merchants to resort to that market for their supplies, it must be admitted that the amount of transportation through the canal from this source will be very considerable. This extent of country is now supplied with most of its importations from Philadelphia and Baltimore by way of the Ohio river. To every mind in the least degree acquainted with the commerce of the western country, it will appear evident, that by opening the proposed communication the channel of that commerce must be changed; that a general revolution in it will take place, and that the proposed canal will be the connecting artery through which the commerce between the

whole western country and the city of New York must pass—that this change in the commerce of the west, thus effected, must essentially promote the interest of our sister states to the south and west; strengthen the bonds of our happy union, and at the same time will enrich our own state by the amount of its tolls; thereby ultimately laying the foundation for an inexhaustible revenue to the state, which will in some degree compensate for the sacrifice made as the price of our early admission into the confederation.

In addition to the importation of foreign merchandize, to which may be added the iron of New Jersey and New York, the article of Gypsum, which abounds in great quantities along the line of the New York canal—on the shores of the upper lakes, and even in our own state on the shores of Sandusky bay, where large quantities have lately been discovered, will form a very considerable and very important item in the transports through the canal, which in addition to its increase of the revenues, will constitute one very important advantage of the canal to a great proportion of the western country.

The fisheries of the upper lakes it is also believed will afford a productive source of revenue to the canal, through which this article must find a market. It will be recollected the product of these fisheries will not seek a market through the New York canal, that country being bountifully supplied with the fish of its own lakes and of the Atlantic seaboard, but will find a market through the Ohio canal in the consumption of the country to the south and west. And, in addition to these sources of revenue, the committee have found their attention turned towards the cheap and inexhaustible supplies of salt, which is afforded in that region of country through which the New York canal passes.

From the superior quality of this salt and the low price at which it can be afforded, compared with that furnished from the Kenhawa and other points on the waters of the Ohio, it is reasonable to anticipate a very considerable increase of the canal revenue from this article.

With these sources of revenue in addition to the estimated amount arising from exports, above made, your committee are of opinion that that estimate may be relied upon as the amount which may reasonably be expected to pass through the proposed canal. If this estimate should be deemed to have any foundation, it will be observed that the revenues arising therefrom will be sufficient, estimating the whole cost of the canal at \$2,500,000, to reimburse the principal and interest of the debt, thus incurred, in less than six years, from the completion of the work.

The committee beg leave to repeat, that in the foregoing estimate, they have computed revenue from the exports alone, and that in making out the amount of 600,000 dollars, they conceive the assumed quantity of 200,000 tons to be strictly within bounds—that to prevent a mistaken result they have thrown in all the vast importations that must be freighted on the canal for this state, Kentucky, Indiana, Illinois, Missouri and other parts, and no inconsiderable amount of exports from beyond the Falls of the Ohio, derived not only from the agricultural products of that district but from the lead of Missouri and the fur trade of the country to the Rocky Mountains; besides the increasing productions of these regions growing with the progressive improvement of the country, accelerated by the influence of a safe and cheap navigation; upon these principles they find that the income from tolls would discharge the interest and repay the principal of a debt incurred for this splendid achievement, in less than six years; but in order to make assurance doubly sure, they forego that estimate, and assume merely one half the amount which extinguishes principal and interest in less than twelve years.

The inquiry into the means of accomplishing a project so grand and beneficial, has engaged much of the attention of your committee; and in this they

perceive no sufficient reasons to justify an abandonment of the proposed examination of the country. The execution of the scheme can be effected, as your committee believe, in either of two ways:—If the state should hereafter resolve to undertake it on public account, the committee are of opinion that it must rely upon loans; and that they can be obtained to the desired extent, without involving the present resources of the state in any embarrassment; and without the necessity of resorting to additional taxes.

In the northern part of this state, the most striking feature for artificial navigation is presented to common observation on the east side of the Sandusky river, where the United States hold a large quantity of land. It is presumed that the manifest interests of the Union would induce Congress to convey 5 or 600,000 acres to this state for a ready money price much less than the rate at which it is now retailed to casual purchasers. Should the route selected by the Engineer traverse that part of the state, the purchase would be so far desirable, that its augmented value, caused by the improvement, would refund the purchase money, and a great part of the additional loans that would be required for the opening of the canal; which might be obtained, in the opinion of the committee, on a pledge of the proceeds from the sales of these lands so augmented in value. The location and actual commencement of the canal through these lands would create a demand for them; and although your committee would be averse to a precipitate disposal of them; yet they would form a resource to prevent the interest of the debt from accumulating while the work was progressing, and when it was completed, would command an amount perhaps equal to its whole cost. It is well known that money lenders who make advances to the public, are best pleased with a pledge of specific funds or revenues; and it is believed from the superior quality of these lands, and the location of sixty or seventy miles of canal lengthwise through them, that loans could be effected on a pledge of their proceeds to a sufficient extent to enable the state to pay to the General Government the price stipulated for the land, and make a very considerable proportion of the contemplated improvements; thus—500,000 acres purchased at \$1 00 per acre would cost the state \$500,000; locate the canal near the centre of the tract which would bring all these lands within an average of nine miles of the canal, and it would be safe to estimate them at \$5 00 per acre, making the sum of \$2,500,000 for which sum of money it is believed these land would be, thus circumstanced, ample security. This would enable the state to pay the purchase money, and would leave \$2,000,000 to apply to the completion of the work. But if 5 00 dollars per acre should be deemed too high an estimate of the value of these lands after the location of the canal through them, the committee would be content to assume \$3 00 per acre as their average value, making a sum total of 1,500,000 dollars, which after paying the stipulated price to government would leave 1,000,000 dollars applicable to the expences of the work, which they believe to be a safe estimate. In addition to this source, a pledge of the revenues arising from tolls on the canal when finished, would to all appearance be sufficient to assure the payment of the interest, and redemption of the principal, in the course of a few years, affording in itself satisfactory security to the lenders, without engaging the state in additional responsibility.

Your committee cannot admit the supposition that the state, with resources like these, will consent to sacrifice what they believe some of the best interests of the country, by placing so fair and rich a harvest in other hands; but if they are mistaken in this opinion, they entertain no doubt that capitalists will be found to take up, without delay, the stock of a company, incorporated for the purpose, under a liberal charter. This, however your committee consider as a last resort. The world owes much to New York, for their

practical refutation of the doctrine which has so long prevailed, that the public could not accomplish works of this kind so cheap as a corporation.

Your committee have not exhausted this interesting subject; they have omitted numerous important particulars, tending to strengthen the position they have taken, and to shew the advantages that would result to the state of Ohio and to the Union, from the contemplated improvement. Their calculations are adapted to a state of profound peace with the rest of the world, and they hope that state may be long preserved; but should the injustice and aggression of other nations produce a maritime war, obstructing our commerce through the Gulph of Mexico, and with the Atlantic ports, the freights that would be borne on the bosom of our canal would exceed any calculation that can be made, and would increase the revenues in the same proportion; or should our country again be scourged with a war with Great Britain, the facilities a canal would afford to the operations of war, by its expeditious and cheap transportation of military stores and munitions to the frontier posts, would save to the nation in money more than its whole cost, and in the lives of her citizens, immense worth and blood. The committee leave to the imagination of the members of this house to picture the political importance the state would derive from such an enterprise and its consequences. They are convinced that if the scheme of uniting Lake Erie and the Ohio by a navigable communication shall be found practicable, it cannot be too soon commenced. They are unable to perceive the probability that the state will be better prepared, in the course of fifty years, than within the next five, to accomplish the project. Perhaps a century may not witness a similar stagnation of commerce in all parts of the world, and so much capital, in consequence disengaged from that employment. The present cheapness of labor and subsistence, mark this as the auspicious period for the undertaking; the consumption by the workmen will furnish a considerable market for provisions; and we may add, a consideration of some importance in the actual state of the country, that the expenditure on this great object of lasting utility will more effectually relieve the citizens of Ohio from pecuniary distress, than all the schemes of paper credit that our sister states have adopted.—The year 1823 will witness the completion of the New York canal, when the experience of their engineers and their contractors—their improvement in labor saving machinery, and implements for the execution of the work, with the laborers now employed in that undertaking, may be brought in aid of ours, should the state think proper to embark in the enterprise.

Your committee therefore confidently recommend that the Governor be authorized to cause the route of a practicable canal between Lake Erie and the Ohio river to be explored, and its cost estimated, and for this purpose report a bill.

Ordered, That 500 copies of the said report, be printed for the use of the members of both houses.

Mr Williams then reported a bill, authorizing an examination into the practicability of connecting Lake Erie, with the Ohio river, by a canal—which was read the first time.

AN ACT

Authorizing an examination into the practicability of connecting Lake Erie with the Ohio river by a Canal.

Whereas, a navigable communication between Lake Erie and the Ohio river would greatly promote the agricultural, manufacturing and commercial interests of the good people of the state of Ohio; and would unite, by the cementing influence of interest and commercial intercourse, the most remote parts of the United States, thereby strengthening the bonds of their political

Union: And whereas, the practicability of making such navigable communication, has not been satisfactorily ascertained by an experienced and skillful engineer: Therefore, with a view to obtain accurate information touching this highly interesting subject,

Sec. 1. *Be it enacted by the General Assembly of the state of Ohio,* That the Governor be, and he is hereby authorized to employ an approved practical engineer, whose duty it shall be to make such surveys and examinations of the country between Lake Erie and the Ohio river, with a view to ascertain the practicability of uniting those waters by a navigable canal, as is directed in this act.

Sec. 2. *Be it further enacted,* That Benjamin Tappan, Alfred Kelly, Thomas Worthington, Ethan A. Brown, Jeremiah Morrow, Isaac Minor and Ebenezer Buckingham, jr. be, and they are hereby appointed commissioners, whose duty it shall be to cause such examinations, surveys and estimates to be made by the engineer as aforesaid, as may be necessary to ascertain the practicability of connecting Lake Erie with the Ohio river by a canal through the following routes, viz: from Sandusky bay to the Ohio river; from the Maumee river to the Ohio river; from the Lake to the river aforesaid by the sources of the Cuyahoga and Black river and the Muskingum rivers; and from the lake by the sources of the Grand and Mahoning rivers to the Ohio river: And it shall be their duty to make, or cause estimates to be made, as near as can be, of the probable cost of cutting a canal on each of said routes, if found practicable; and to make an estimate of their comparative advantages for a canal, which estimates it shall be their duty to report, so far as may be completed, to the next General Assembly, accompanied with their views generally, and such information touching the contemplated improvements as they may deem important.

Sec. 3. *Be it further enacted,* That it shall be the duty of the commissioners aforesaid, to meet at Columbus at as early a day as an engineer can be obtained, on the notification of the Governor, who shall name the time, and at such other times and places as they may deem necessary for the promotion of the objects hereby intended. And it shall be their duty, when convened as aforesaid, to make the necessary arrangements and preparations for the commencement of the proposed surveys and examinations—to employ the necessary assistants to enable the engineer to discharge the duties required of him—to take the necessary measures to obtain such information generally, as will promote the objects of the surveys and estimates hereby authorized; and to make report of the same as required by the second section of this act. And it shall be their further duty, or a majority of them to report to the next General Assembly, such views and information as they may be enabled to obtain as to the ways and means of making such canal, should it be found practicable.

Sec. 4. *And be it further enacted,* That a sum not exceeding six thousand dollars, be, and the same is hereby appropriated, for the payment of the charges and expences which may be incurred in making the surveys and estimates hereby authorized, to be paid out of any money in the treasury not otherwise appropriated, on the certificate of the commissioners accompanied by proper vouchers.

JOHN BIGGER,

Speaker of the House of Representatives.

ALLEN TRIMBLE,

Speaker of the Senate.

January 31, 1822.

The following article, although from the pen of a private individual, yet was deemed of sufficient importance by the Governor of Ohio, to be communicated to the Legislature. To have preserved the order of dates, it should have been inserted, near the bottom of the 14th page, immediately before the "Extract" from the Governor's message.—E.D.

Considerations on the project of a Canal, to connect Lake Erie with the Ohio river, submitted to the Legislature of the state of Ohio.

Nothing can be of more importance to the state of Ohio, than the making of a navigable canal from Lake Erie to the Ohio river. That it is practicable to make such canal admits not of a doubt. Were it made and the Hudson and Erie canal finished, we should have an easy and cheap highway on which to transport our surplus produce to the New York market. I have had the levels taken at three different places, from the summit level between the Scioto, and the Sandusky, to the head of Sandusky bay at Lower Sandusky. From the summit level on the most favorable route for a canal that I am acquainted with to Lower Sandusky, the descent, agreeable to the report of Mr Forrer, whom I employed for the purpose of taking the levels, is 318 feet. Mr Forrer had good instruments, and I presume that the levels are taken with tolerable accuracy. By the report of the engineers employed by the state of Virginia, they make the Ohio river at the mouth of the Great Kenhawa river, 83 feet lower than Lake Erie. If those levels are to be relied on, and we ascertain what is the amount of the descent in the Ohio, from the mouth of the Great Kenhawa to the point where the canal is intended to communicate with the Ohio, we will then know what will be the whole amount of lockage required. If we allow 50 feet for that descent, the lockage will be as follows: From Lake Erie to the summit level 318 feet: From the summit level to the Ohio 433 feet, making the whole amount of lockage 751 feet. The estimate by the commissioners for making the New York canal is 13,800 dollars per mile. Owing to the reduction in the price of labour, it is found that it can be made for much less money. The ground for making a canal across the state of Ohio, is much more favorable than that over which the New York canal is now making. And although there would be more lockage on the Ohio canal than on the New York canal, yet it is believed that it can be made at less expence than an equal distance of the New York canal. There would not have to be that heavy expence incurred in excavating rock that is encountered on the New York canal. When we take into consideration the low price at which labor can be had, and the advantage to be gained by the employment of experienced engineers, now employed on the New York canal, I think I hazard but little in saying that a canal can be made across this state for 12,000 dollars per mile. If we suppose the canal to be 200 miles long, at this rate it will cost 2,400,000 dollars. I am aware that some will say that the state of Ohio is too young and too poor to undertake this mighty project. But I deny that the state of Ohio is either young or poor. She contains at this time more than 500,000 souls, and ranks the fourth or fifth state in the Union. Can a state with such a population be young? Can a state with such a population (of industrious people too) be poor? It has been justly remarked, "That population is power, and industry is wealth." So I contend that we are both powerful and rich. If the whole line of the canal was divided into feet, it would not make (admitting its length to be 200 miles) 13½ to each man in the state subject to militia duty. The inquiry by some will be, how is the money to be raised to dig this mighty ditch! Raise it in the same way the state of New York does—borrow it on the credit of the state. Many there are, I have no doubt, who will doubt whether money can be borrowed on the credit of the state: To such I would

say, go and try. If we stand at the base of a hill and look up without making an effort to ascend we will never reach its summit, and may be fairly estimated on the completion of the canal, it will produce a revenue that will discharge the interest, and enable the state to pay large annual instalments of the principal debt; and in addition to the instalments, in a few years, defray the whole expences of the state government. The amount received for toll could be expended in making the canal; so, that although it cost 2,400,000 dollars, yet it might not be necessary to borrow any thing like that sum. The distribution of the sum of money that the canal would cost among the people of this state, would give them more relief from their present pecuniary embarrassments, than can be had from any laws that may be enacted for that purpose.

As the lands in the vicinity of the canal belonging to the General Government would be greatly enhanced in value, I think it not improbable that Congress will make a donation to the state of a body of land in its vicinity so far as it passes through their territory, if so, it would aid very much in making it. The celebrated Brindley, the greatest engineer that England, or perhaps the world ever produced, Mr Phillips, in his history of inland navigation says, "Having spoken of various circumstances of rivers before a committee of the House of Commons, in which he seemed to treat all sorts of rivers with great contempt a member asked him for what purpose he apprehended rivers were created. After considering a moment before he gave his answer, replied, to feed navigable canals." Such was the opinion of this great man, and such indeed must have been the opinions of many others; for we find canals in Great Britain in many places running parallel with navigable rivers. Persons unacquainted with the cheap rates at which goods are transported on canals, are surprised when they learn that a ton weight can be transported at the rate of one cent per mile. The illustrious Fulton but a short time previous to his death, gave it as his opinion that goods could be transported on the New York canal, when completed, at the rate of one cent per ton per mile. We find him supported in this opinion by Charles G. Haines, Esq. "Corresponding Secretary to the New York Association for the promotion of internal improvements." Col. Haines' situation enables him, on this subject, to form correct opinions; his opinions on any subject are entitled to great respect. Mr Phillips, in the preface to his history of inland navigation, says, "All canals may be considered as so many roads of a certain kind, on which one horse will draw as much as 30 horses do on ordinary turnpike roads, or on which one man alone will transport as many goods as three men and eighteen horses usually do on common roads. The public would be great gainers, (he further adds) were they to lay out upon the making of every mile of canal, twenty times as much as they expend upon making a mile of turnpike road."

"Sutcliff in his treatise on canals says, "That within the last 25 years there has been expended on canals in England, more than \$130,000,000."

A country is never made poorer by making internal improvements, even if the people are taxed to make them. If money be taken from the people it is again paid out among them and kept in circulation. Were the canals through Ohio and New York finished, I have no doubt but that two thirds of the surplus produce of all the country watered by the Ohio and its tributary streams above the Falls, would pass through them to the New York market. That it would be the interest of every shipper to give the preference to New York is obvious. You have there a healthy climate, where if you think proper to store up your produce, you can do it in safety. Not so at New Orleans; if you there store up perishable articles they may be considered next to lost. The amount of produce that perishes on the way to and at New Orleans, every 15 years would itself more than pay for building a canal

across the state of Ohio. During the spring tides, when the principal part of the produce of the western country is carried to New Orleans that market is glutted, and the shipper is very often pleased at being able to return home with half the money his cargo cost him.

If Mr Fulton's estimate as to the expence at which goods can be transported on canals be correct, the expence of transporting a barrel of flour to the city of New York (allowing ten barrels for a ton) will be as follows:

	<i>Miles.</i>	<i>Cents.</i>
From the Ohio to Lake Erie	200	20
Down Lake Erie	260	20
Through the New York canal	353	35
Down the Hudson to the city of New York	160	15
Total	973	90

To this must be added the tollage through both canals.

The lowest rate at which flour is at present freighted to New Orleans from the falls is \$1 25 per barrel. Nor is it probable that the price will be reduced, as the boats which cost from 100 to 150 dollars is generally thrown away at New Orleans, or sold for a sum not exceeding the tenth part of their cost. Opportunities but seldom offer to ship in steam boats, owing to the difficulty of passing the falls. It will be recollected, that while our produce is carried to New York, at the cheap rate quoted above, that our foreign goods can be brought through the same channel at the same rates (whereas, at present, the expence of transportation costs from 3 to 5 cents per pound or from 67 to 112 dollars per ton.) More or less of these goods the people will have, and the cheaper the rates at which they can be furnished, the better for the country. And besides, it must be recollected, that if they are brought across the mountains by way of Pittsburgh, or from New Orleans, by way of the Mississippi and the Ohio, that the expence of transportation is paid to the citizens of other states. If they are brought through the Ohio canal, the money saved in the state thereby, would in twenty-five years, amount to more than the whole cost of the canal. It must be admitted that the risk on the canal and lake, is much less than on the Ohio and Mississippi, and the time required to carry the produce that way, much less.

By turning the trade from New Orleans to New York, we would save thereby, the lives of many of our most enterprising and useful citizens, who would otherwise fall victims to the diseases of the lower Mississippi. The state of Kentucky has lost more of her citizens by the Orleans trade within the last fifteen years, than she has lost by the late war, and it is known, she bled at every pore.

Lateral canals may be made from the main canal in many places, which will serve to collect to the main canal the rich products of the soil through which they pass, and at the same time afford means of furnishing the country with many of the necessaries of life, at prices greatly below what they now cost or ever will cost without the canal, I will only name the article of salt which by the means of the canal may be furnished to the people in the interior of the state, from the Salines of New York, at a price, but little, if any thing, exceeding fifty cents per bushel. It is impossible to calculate what will be the benefits that may be derived to the people of this state by the making of the canal. In its progress, it will, no doubt, lay open rich beds of minerals. It will lay us, as it were along side of the Atlantic. It will, in short, elevate the character of the state, and put it half a century in advance of her present situation.

And I would respectfully inquire, whether the convicts now in the Penitentiary might not be more usefully employed in making a canal, than at work in the Penitentiary?

It only remains for the legislature of Ohio to apply the means within their reach to accomplish this desirable object. When accomplished, there can be no doubt but that it will produce a sufficient revenue to defray the expenses of the state government forever.

Cincinnati, December 2, 1820.

W. STEELE.

Extract from Acting Governor Trimble's Message, of December 5th, 1822.

"Soon after the passage of the act of the last session of the General Assembly, authorizing an examination into the practicability of connecting by a navigable canal, the waters of Lake Erie with those of the Ohio river, measures were taken in obedience to the duties assigned the Executive by that act, to procure the services of an "approved practical engineer." I believed it to be the object of the law, to have the several surveys and the examination contemplated, made by an engineer, whose situation would place him above suspicion of partiality in favor of either of the proposed routes, and whose talents, experience and practical skill, would attach public confidence to his report, and enable the present General Assembly to decide what further measures it would be necessary to adopt, in relation to the interesting subject of the canal. Therefore I did not hesitate to apply to New York; not because I conceived our own citizens deficient in talents or science, but because there were none within my knowledge who possessed the necessary experience and practical skill, whose local situation would not have subjected their report to the objection I have named. Mr James Geddes was therefore employed. I think it due to this gentleman, as well as to myself, to say to the Legislature, that the Governor of New York (who was applied to on the subject,) together with the canal commissioners of that state, recommended Mr Geddes, as one of the most approved, skilful and practical engineers, who had been employed upon the New York canal, a gentleman of much integrity and responsibility of character, and every way qualified for the important services required to be performed by the Act of Ohio. The manner in which the engineer has performed the laborious and highly responsible duties assigned him will no doubt be adverted to by the canal commissioners in their report, which will afford the best evidence of his practical skill, his claim to the high character given him by his distinguished fellow citizen, and the propriety of the appointment.

From the information received (though not official) permit me to congratulate you, and our fellow citizens, on the favorable result of the examination, and the flattering prospect of the auspicious moment soon arriving, when the united intelligence of Ohio shall marshal her energies and resources, and make a simultaneous effort, for the accomplishment of the grand and magnificent enterprise of connecting by a navigable canal the waters of Lake Erie with those of the Ohio.

"The agricultural, manufacturing and commercial advantages, resulting from internal improvements generally, and particularly those of the permanent and stupendous character of the project now under consideration, are subjects well calculated to engage the attention of our industrious and enterprising citizens, and bring into action all the talent, resources and energies of the state."

FIRST REPORT OF THE CANAL COMMISSIONERS.

Extract from the Journal of the House of the Representatives, of 3d Jan. 1823.

"Mr Worthington on behalf of the board of canal commissioners made report which was taken up and read as follows, to wit:

"That in obedience to the provisions of the above recited act they convened at Columbus, on the notification of the acting Governor on the 20th of

May last, proceeded to organize the board, and to a discharge of their duties. By the act aforesaid, it is made the duty of the commissioners to cause such examinations, surveys and estimates to be made by the engineer to be employed for that purpose, as may be necessary to ascertain the practicability of connecting Lake Erie with the Ohio river by a canal through the following routes, viz:

"From Sandusky bay to the Ohio river; from Maumee river to the Ohio river; from the Lake to the Ohio river, by the sources of the Cuyahoga and Black rivers and Muskingum river; and from the Lake by the sources of the Grand and Mahoning rivers."

"Duly impressed with the extent and importance of the duties assigned them, the commissioners lost no time in giving to the engineer the necessary instructions, and in other respects preparing him for the accomplishment of the intentions of the General Assembly; and determined that one of the board should accompany him. They now respectfully submit to the General Assembly the results of the examinations made at the summit levels and elsewhere, in pursuance of the provisions of the aforesaid act.

"As the engineer contemplated by the act of the Legislature, had arrived in the state some time before the meeting of the commissioners, one of the members of the board (Mr Kelly) had employed him in an examination of the Cuyahoga and Tuscarawas and Grand river and Mahoning summits; and had ascertained that from the Cuyahoga river, in the opinion of the engineer, a sufficient supply of water could be obtained and taken across the summit, for the feeder of a canal to be carried to the Ohio river either through the valley of the Tuscarawas or Killbuck, and from the same summit to the Lake. The commissioners, in accordance with the duties required of them, proceeded to instruct the engineer to examine the summit levels between the Maumee and Miami rivers; between the Scioto and Sandusky rivers; between the Black and Cuyahoga rivers, and the waters of the Muskingum; and between the Grand river and Mahoning, to ascertain the relative heights of these summits, and the practicability of connecting, through these routes, the waters of Lake Erie and those of the Ohio.

"The commissioners believed that they would accomplish in this manner, the wishes of the General Assembly, and consult the best interests of the people of the state, in giving to the contemplated canal that direction which would, while it was most generally useful, greatly add to the value of a tract of country through which it would pass, and which lies distant from any navigation; and at the same time unite the great interests of the state. They therefore unanimously determined to examine the face of the country from the Cuyahoga summit, to ascertain the practicability of making a canal from that summit in a southwest direction, to a point on the Scioto as far north of Columbus as practicable; thence through the state to the Ohio river; with a view also of making a canal from the same summit eastwardly to the Ohio river, and northwardly to the Lake. In pursuance of this object the engineer commenced at the Black river and Killbuck summit; proceeded down the valley of the Killbuck to Millersburg, in Coshocton county, with the level of the summit, and found that the lowest pass from the valley westward, was at Round Prairie, 9 miles southwest of Wooster, where the ground was 48 feet above that level. The continuation of high ground from this place to the mouth of Killbuck, rendered it impracticable to effect the intended object in that direction. The engineer then proceeded with one of the commissioners to examine the practicability of taking a canal from the Cuyahoga and Tuscarawas summit, through the county of Columbiana, to the Ohio river. On examination it was found that the lowest pass was at a large swamp on the north side of Stark county, from which flow the waters of Nimishilling, Break Neck and Deer creeks; this swamp was found to be 553 feet above the level

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY BY JOHN KILBOURN, AT \$3 A YEAR, IN ADVANCE.

VOL. I. COLUMBUS, OHIO, SATURDAY, JULY 5, 1828. NO. 3.

The following article, from a Cincinnati paper, the Western Tiller of the 27th ult. shows the estimation, in which such a publication, as this is held by intelligent individuals—and is also a source of gratification to the publisher, to perceive that his exertions to benefit both himself and others, is duly appreciated.—Two or three other similar flattering notices in different quarters, have been observed. It shall be the editor's earnest endeavors that the favorable expectations thus formed, and expressed, shall not be disappointed.

"A new periodical publication, under the title of the 'Civil Engineer and Herald of Internal Improvement,' has been commenced at Columbus, by John Kilbourn. The first number has been received here, and as we doubt not that it will be a useful and interesting work to many of our readers, we annex the prospectus. The career of internal improvement commenced by this state, and continued thus far under the most favorable auspices, gives us reason to expect that the most interesting portion of its history, will be that of its public works, and it is gratifying to find that a plan for preserving and disseminating it, is thus early adopted. The 'Civil Engineer' is published weekly in an octavo form, and will yearly constitute two volumes of convenient size, in which many important documents will be preserved.—It is also valuable in furnishing a suitable medium for the publication of such communications as the experience of our engineers may enable them to give the public, and from the industry and talents of those at present in the service of the state, we have little doubt of their ability to furnish much valuable information on subjects connected with their profession."

Man must enjoy health, to pursue any avocation in life. It is sincerely believed that a great part of the sickness experienced by residents in the state of Ohio, and perhaps in the western country generally, during the summer and early autumnal months, might be avoided by daily ablutions; wherein the whole body is immersed in water. The length of time, of being in the water, should however, not exceed from three to five minutes.—As the summer sun, with his scorching beams now burns with raging heat, and the cool mid-day bath is most grateful to the fervid limbs, the following article from the Bal-

timore American, it is hoped will not be unacceptable.

Bathing and Swimming.—The sultriness of the season naturally draws attention to the means of counteracting it; means in which, considering the nature of our climate, we must be confessed to be singularly deficient. Our thin walls, our wide and shadeless streets, our unsheltered roads, and our costume borrowed from a northern climate, would all appear so many mischievous contrivances to augment the fervours of our own. We have spent many words on these discomforts arising out of neglect and habit. There is another which we also seem to have borrowed from our ancestral land,—the neglect of the bath; a luxury which prevails in all other countries, we believe in the same latitudes. There is so much the more necessity for this wholesome and pleasant habit of bathing, as was judiciously remarked in the Chronicle a day or two ago, from the greater variableness of our climate. There is at least as much need of it here as in Greece, where, yet, as our classical readers may remember, it is ranked by the poet with wine and the ladies. In Turkey, in Persia, in Egypt, the bath is as cheap as the hourly *dram* unfortunately is here; and there can be no hesitation as to which is the preferable mode of invigorating the body, and cheering the spirits. In Rome, both imperial and pontifical, wealth was profusely expended in baths and fountains, while our republican simplicity seem satisfied with a hebdomadal ablution, with very little of the circumstance of luxury or even comfort. We acknowledge with gratitude to the arts, that the diffusion of linen and cotton stuffs among all classes,—conveniences little known to our early forefathers,—renders this neglect more tolerable. But why not reap the benefit of a double luxury?

We should be very glad on the score of health alone, to see the habits of our people taking such a turn as to render the multiplication of convenient bathing-houses a matter of common necessity, rather than of mere luxury, confined comparatively to a few. But in a great town like this, there are many persons still addicted to that salubrious exercise of their boyhood, *swimming*, who disuse it for want of a suitable spot, within a convenient distance. They have in Boston a delightful bath for this purpose; close chambers attached to the bridges which cross the inlet of the sea, called Charles River, which admit the sea water, and are of sufficient depth and capacity for swimming. Such a contrivance, or a number of them, might easily be constructed in some part of the waters of our harbor, which, surrounded as it is with a dense population cannot otherwise be used for bathing.

Fresh water swimming baths on the streams near the city, are wanted for the same reason; and either would, perhaps, be worth the experiment. In so large a population, encouragement would speedily be found for such establishments, if once people could be persuaded of the health and innocent luxury of universal bathing and swimming in our fervent summer. With all the boasted luxuries of India, "shade and cold water," says Bishop Heber, "are the true ones;" and who ever has sweltered through some of our summers, will much incline to the same opinion in regard to our own country.

In the last number of the National Enquirer, printed in this town, is the following article, copied from the Richmond Compiler.

"The merchandize landed at Sandusky, state of Ohio, amounted, during the last season, to \$1,219,323. It should be recollected that Sandusky is on Lake Erie. What an immense mass of merchandize therefore, may be expected to pass through that port, when the Grand Canal of Ohio is completed."

The statement of fact in the foregoing notice is unquestionably correct; but the inference, that the business of the port of Sandusky will be greatly increased by the completion of the Ohio grand canal, we are not prepared to admit. For it so happens that the canal terminates in the lake, at Cleveland, 60 miles east from Sandusky; so that whatever effect its completion may have upon the port of Sandusky, will be to lessen, rather than to increase its business.

In an eastern editor, not acquainted with the localities of this state, such an error is not so censurable: but, an Ohio editor should never have given currency to it. Were it not for the respectability of the National Enquirer, which, in point of talent and general correctness we consider far above the average of western papers, that paragraph would never have elicited the present remarks.

An agent for the Welland canal, says a Quebec paper, is in London procuring additional stock, for the completion of that great work.—This canal is to connect lake Erie and Ontario, by a sloop and steam boat canal and locks sufficient to admit vessels of 100 tons burden to pass.

It is stated, in a late Philadelphia paper, that owing to the extraordinary demand for laborers on the Pennsylvania canals, (about \$2,000,000 worth of new contracts being let this year,) that wages are from twelve to fifteen dollars a month.

The Boston evening Gazette furnishes us with the following account of the Dry Dock, now erecting at Charlestown, Mass.—

"We are extremely happy to be able to state, that all the preparatory arrangements for the execution of this great work have so far, proved most favorable to the undertaking. The coffer-dam, upon the effectual security of which, every thing depends, proves perfectly tight, and does great credit to Mr Baldwin, the Engineer, who constructed it. It con-

sists of a case made of two rows of large piles, from 6 to 10 feet apart, dove tailed together, and otherwise secured. Between these the space is filled with clay, effectually rammed in, up to high water mark. The pressure of water, at high tide, is considered equal to 500 tons upon each of its sides.

There are now about 300 workmen employed in making the excavation for the Dock, which will be about 300 feet in length, and 80 in breadth. The soil turns out to consist chiefly of a very solid kind of clay. The foundation of the dock will probably be about 34 feet below the ordinary height of the full tide. The depth of the inside of the dock from the coping, will be not far from 30 feet—and it is estimated that, taking an average of the daily height of the tides for a year and a half, a vessel of war drawing 25 feet of water, may enter the dock twenty days of each month. The dock will consist of Quincy Granite, laid in Roman Cement, or Hydraulic Lime. The surplus water will be pumped out by a steam-engine. The inside will be guarded by two gates, which we cannot clearly describe, but which, to judge by the model, appear to offer every security to the workman and the works within the enclosure.

It is particularly gratifying to us, that this *first experiment* in the United States of building a Dry Dock for the repair of ships of war has thus far proved to have been so eminently successful. We think if no accident occurs before its completion, that it may be constructed within the estimate of the Engineer, which anticipation we hope will prove true.

We hear the Dock at Norfolk is to be constructed on a similar plan.

Speed.—For a few weeks past we have received our New York papers in about five days from their date, a distance of 620 miles. Six years ago, about two weeks were occupied in performing the same distance.—*Painsville Tel.*

The Board of Ohio Canal Commissioners meet at Chillicothe on the 10th instant; so soon as we can obtain an account of their proceedings, our readers shall be duly informed thereof.

Erratum.—In the 2nd No. a gross error passed the press, unnoticed. It occurs in the first page, first column, 9th line from the bottom, in referring to the late loan authorized by the state of Pennsylvania, for \$1,000,000 read \$2,000,000. It occurred from an incorrect copy.

CANAL LEVELLING INSTRUMENTS.

The subscriber manufactures and keeps constantly on hand the above instruments, at his establishment in Gibbonsville, opposite Troy, N. Y. Also, all kinds of Surveyors' Compasses.

He flatters himself, from the long experience he has had in the business, with H. Hanks, to whom he would refer those who may wish to make inquiry respecting the truth and workmanship of the Instruments, that he will receive such a share of the public patronage as the truth and accuracy of his work may merit.

ANDREW MANEELY.

of Lake Erie. It being found impracticable to bring the Cuyahoga to this swamp, further examinations in this direction were deemed fruitless. Finding from these examinations, that the elevation of the country eastward between the Cuyahoga summit and the Ohio river, and southwest from the same summit, made it impracticable to conduct a canal in the direction contemplated. The commissioners determined to make another effort to effect the same object, by pursuing a different route. At a second meeting of the commissioners, which took place in September last, they directed the engineer to take the level of the Tuscarawas and Killbuck to their junction, and the Muskingum to Wakatomaka; thence up Licking to Newark, and across to Little Walnut creek summit, and to the Scioto; and that it should be ascertained, by the necessary levels, whether Mad river could be brought into the valley of the Scioto; intending, if this should be found practicable, to give the canal the direction first mentioned, west of the Scioto. On examination it was ascertained that a canal could be led from the Tuscarawas or Killbuck summit, along the valley of either of these streams, and along the valley of the Muskingum, to Wakatomaka; and from thence, by using Owl and Licking creeks as feeders, a canal could be conducted across to the valley of the Scioto a short distance below Columbus. On the west side of the Scioto, from every examination made, it was found impracticable to bring Mad river to a point where, in the opinion of the engineer, it would furnish water sufficient to supply a canal to the valley of the Scioto.

The foregoing examinations were not made in the order in which they are stated; but that they may be better understood, it is thought best to connect and present them together.

At the meeting of the commissioners last mentioned, they instructed the engineer to gauge the streams which are in the vicinity of the Scioto and Sandusky summit, and which can be brought on said summit, at a proper time. In consequence of the rains which took place, soon after, the engineer was prevented from making this examination.

The information obtained at the different summits on the routes contemplated to be examined is now respectfully submitted.

Routes by the sources of the Mahoning and Grand rivers.

On examination it is ascertained that the summit level of the Mahoning and Grand Rivers is 342 feet above the level of Lake Erie, and by estimate is 224 feet above low water in the Ohio River at the mouth of Big Beaver. A feeder to a canal on this route must be drawn from the Cuyahoga; but whether a sufficient supply of water can be obtained is not well ascertained. From the best information, the engineer thinks it probable. This route is much shorter than any other between the Lake and the Ohio river, would require less lockage, and less labor in the construction of a feeder. Should it be found practicable to make a canal along this route, part of the canal would pass through Pennsylvania.

Route by the sources of the Cuyahoga river, and Tuscarawas branch of the Muskingum

The waters of the Tuscarawas and Cuyahoga have their rise in an extensive swamp, from which streams run into both rivers, and it is ascertained that the summit level of these rivers is 404 feet above the level of Lake Erie, and is estimated 428 feet above the level of low water, at the mouth of the Muskingum. It has already been stated that water may be taken from the Cuyahoga to supply a canal passing the valley of the Tuscarawas and Muskingum to the Wakatomaka, where the examination ended on this river. The engineer considered the making a canal along the valley of the Tuscarawas

practicable, but attended with considerable difficulty and expence. He also concludes that the leading of a canal from the summit to the mouth of the Cuyahoga river, whilst it is practicable will be attended with some difficulties.

Route by the sources of the Black river, and the Killbuck branch of the Muskingum.

The summit level on this route is ascertained to be 337 feet above the level of Lake Erie, and by estimate 361 feet above the mouth of Muskingum, and is lower than any other yet examined in the state. The valley of the Killbuck is ascertained in many particulars to be very favorable to the project of leading a canal through it; the descent in the whole length is very gentle, and the low lands which are every where wide, can but in few places, be called alluvial. The inundations cover the flats but a few feet in depth, owing to their width; and the total absence of any large streams falling into the valley, wide spread, and with a declivity so gentle; the floods move placidly along threatening no disaster to any erections connected with the stream; but the difficulty of getting water to supply the summit of a canal is represented by the engineer to be a great drawback on all the advantages which it possesses. To the expensive feeder necessary to bring water to the Cuyahoga and Tuscarawas summit, must be added a feeder from said summit to a branch of Killbuck, making a distance from the place where it would leave the Cuyahoga river, to where it would enter the canal of near 50 miles. 39 miles of it an artificial cut. The engineer concludes that notwithstanding the cost of this long feeder, a canal on this route, will cost less than that of the Cuyahoga and Tuscarawas.

The valley of Black river is represented as not presenting many difficulties to the making a canal along it for a considerable distance, when by leaving the river and passing back of the deep gullies, no difficulties present themselves in getting to the Lake.

From the views which have been given, it will be seen that a canal led through either the valley of the Mahoning, Tuscarawas or Killbuck must depend for a necessary supply of water at their respective summit levels, on the Cuyahoga river, and it is the opinion of the engineer, that this river is no more than sufficient to supply one canal.

Route by the sources of the Maumee and Great Miami rivers.

The summit level of these rivers is ascertained to be 399 feet above Lake Erie and by estimation 550 feet above the surface of the Ohio river at low water at Cincinnati.

This summit must be supplied with water by a feeder from the Great Miami at or near the mouth of Indian creek. From this source the engineer has strong hopes that a sufficient supply can be obtained; but if it should fail, he represents that a copious supply can be drawn through a feeder from Mad river.

This canal will be longer than either of the others, and the amount of lockage much greater. From this summit level the engineer states there is no obstacle to prevent a canal from being carried over into the valley of the Auglaise river, which will be much shorter than following the valley of the St. Mary's river.

Route by the sources of the Scioto and Sandusky rivers.

The summit of level of these rivers is ascertained to be 354 feet above the level of Lake Erie, and 455 above low water in the Ohio river at Portsmouth.

The engineer represents that the main branch of the Great Miami with several other durable streams which fall into it may be brought by a short feeder to the Scioto at Round Heads town. He states that it is probable the feeder from the Sandusky will not exceed 6 or 8 miles in length, and that from the sources already mentioned, including the two branches of Whetstone, and others which may be obtained; it is highly probable that there will be an ample sufficiency for the summit pound of this canal. The engineer states that the Sandusky and Scioto valleys may both be pronounced favorable to the conducting a canal along them when compared with the valleys of most other rivers, and very favorable when compared with that of the Mohawk, in the state of New York. The particular advantages possessed by said valleys, is the facility with which the canal in most places may be led along on a level, altogether above the alluvial bottoms on the margin of the rivers entirely secure from floods; so menacing to canal works. The total absence of lateral rivers, is an advantage on this route worthy of note. The Bigbelly, Little Walnut and Salt creeks being the most formidable, each of which drains, comparatively, but a small tract of country.

From the examinations made of the country and streams between the Scioto and Muskingum rivers, it is ascertained that with the aid of Owl and Licking creeks, it is practicable to lead a canal from the summit which divides the waters of the South Fork of Licking, from those of Little Walnut creek, to a canal which may be lead down the valley of the Muskingum, and from the same summit to a canal which may lead down the valley of the Scioto.

From the examinations made, it will appear there is reasonable ground to conclude, that it is practicable to make a canal from the Lake by the sources the Grand river and Mahoning. The Cuyahoga and the Muskingum or the Black river and Muskingum to the Ohio river.

From the Lake by the sources of the Scioto and Sandusky to the Ohio river, and from the Lake by the sources of the Maumee and Great Miami, to the Ohio river. By the second section of the act aforesaid it is made the duty of the commissioners after an examination of all the routes aforesaid, to make, or cause estimates to be made as near as can be, of the probable cost of cutting a canal on each of said routes, if found practicable, and to make an estimate of their comparative advantages. From the extent of the examinations required, together with the short time, and the limited means allowed them, the commissioners are unable to make any estimate which can be relied on, either of the costs of a canal by any one of the routes aforesaid, or of the comparative advantages of each route, other than what may be drawn from the facts, they have the honor to communicate, without further or more accurate examinations. In a matter of such high importance to the state, nothing should be left to conjecture, the information obtained by the examinations made, has disclosed this important fact, that there is no doubt of the practicability of making a canal on some one if not all the routes; but until an actual location takes place, nothing like a correct estimate can be made of the expence of making a canal on any one route. The local situation, facilities and expence of construction of each must in a great degree determine its advantages when compared with the others.

To enable the commissioners to lay before the General Assembly correct information on these important points, more time and further and accurate examinations are necessary, and with the proper means, they have little doubt of effecting the object contemplated by the law within the next season, so as to lay before the next General Assembly such information as will authorize a decisive course to be adopted.

The advantages of canal navigation over any other mode of conveyance, are now so generally known, and so justly estimated that a minute analysis

them is not deemed necessary. The fertility of our soil promises to secure to the labors of agriculture an abundance, very far beyond any probable consumption in our own territory.

The amount of tonnage which this surplus may furnish for the employment of a canal navigation cannot be estimated by the commissioners. When the millions of acres of forest lands within the state shall become private property and cultivated farms: When our present produce shall be quadrupled in amount; its weight and its value would startle the utmost credulity of anticipation to estimate; yet wise and prudent legislators, with the experience this state has had, will look forward to such a state of cultivation and improvement, not as a visionary or uncertain speculation; but as the certain effect of existing and operating causes.

But the products of agricultural labor will not be the only articles of bulk and value, the transportation of which to distant markets will be opened by a canal navigation. Among various other articles which may be mentioned, the gypsum of Sandusky, and the fisheries of the upper lakes are inexhaustible sources of supply to the interior of the state, and the vast region of the south, of an article of great value to agriculture, and the arts; and an article at present of costly diet, owing to the expence of land transportation from the Atlantic cities.

The mineral coal of Ohio, is another material, at present of value only in its immediate neighborhood; which by a canal navigation would become an important and very valuable article of exportation. To all these, the amount and value of which we know must be great, though we want the means of justly estimating them; may we not add the produce of manufactories which must spring up and flourish in a state possessing within herself in her coal, iron ores, flax, wool and a variety of other articles, abundant raw materials for manufacturing those fabrics of necessity, and comfort, with which we are now supplied from the work shops of Europe; from whence, indeed we must cease in a great measure to be supplied, so soon as the government of the Union in its wisdom, shall place the American artizan on fair equal ground of competition with the foreign, in the American market.

In estimating the value of our surplus productions, it must not be forgotten that every saving in the expence and labor of transportation to market directly, increases that value and as directly also, increases the value of our lands. It is ascertained that on a canal, one horse will transport as much as will require the labor of 30 horses upon land; and that one man by this method of conveyance can do more work than three men and eighteen horses in transporting by land. It would be easy to calculate of how much greater value would be the 100,000 bushels of wheat grown yearly for market in Montgomery county by opening to its farmers an easy and cheap method of transportation by a canal to Cincinnati; but, it would be difficult to calculate the enhanced value of property which would result from opening a canal navigation to a new and better market for all these productions which now are of no value as articles of commerce. Our rich and abundant mines of coal may be instanced. It is not unreasonable to anticipate that a great extent of country may hereafter draw its supply of fuel from this source by means of canal navigation.

The commissioners are of opinion that on all the routes, which may be found practicable, stone of good quality for locks may be obtained without much difficulty or expence; the water lime has also been found by one of the board to be abundant in the counties of Belmont and Jefferson; and there is reason to believe that it may be discovered in various other parts of the

state. This article of absolute necessity for a cement in the construction of locks, possessing the property of hardening in water, will be an object of further examination on the routes where canal navigation shall be ascertained to be practicable.

It being the duty of the commissioners to report to this General Assembly "such views and information as they may be enabled to obtain as to the ways and means of making such canal, should it be found practicable," and the commissioners being of opinion that it is practicable to make a canal on some of the routes examined, have taken that part of their duty into consideration. A state government, owning no funds must resort to taxation or loans, for the means of carrying on, and perfecting public works; if these works are of mere temporary use, like the current expences of government; the cost of them should be defrayed by direct taxation, for it would be both unwise and unjust, to burthen posterity with debts contracted for objects of no use nor importance to them; but the case is far different with works of great permanent utility, and of such, the ages which are to follow us on the stage of action, will reap the benefit, and may well bear their proportion of the expence. The great public works progressing and completing throughout the Union, may be compared to the revolution achieved by our fathers, the expence of which is indeed a burden upon us, but a burden light and trivial, when compared with the great blessings we enjoy in consequence of it. The commissioners would not, therefore, hesitate to recommend the prosecution of a work of such great value, by loans (which they are assured could be obtained) if such a course should be found necessary; but they are of opinion that the state may obtain funds for making a canal without resorting to taxation at least for the principal means.

The school lands and the salt spring lands, amounting to about 700,000 acres, at present are of little or no value to the state. The former are vested in the state, in trust, for the support of schools; the latter are granted to the state in trust also, to apply under certain restrictions, the rents of them to the use of the state.

Without advertng to the manner in which this property has been managed or anticipating any great improvement in the management of it, it may be assumed as at least probable, that it will never produce a net revenue of six per cent on its present value, applicable to the objects of the trust. This property, by the consent of Congress, might be sold, and the monies arising from it vested in a canal, which would surely be productive of some profit, and which, so far as respects the school lands, the state may safely guaranty, shall produce six per centum, to be appropriated exclusively to the support of schools: Besides these lands, it is submitted to the consideration of the legislature, whether it would not be better to retain the three per cent fund, with a view of applying it to making a canal; thereby giving to that fund an application which will be of permanent utility. It may fairly be presumed, that the government of the United States, sensible that making a canal from the Lake to the Ohio river through their lands, would greatly enhance the value and accelerate the sale of them. would either grant to this state the right of purchasing the Indian reservations within this state, or make a liberal donation in lands in aid of the work. A majority of the commissioners therefore recommend to the General Assembly, to cause application to be made to Congress, for their consent to the sale of the school and salt spring lands, and to the vesting of the proceeds of them in a canal, to be made from the Lake to the Ohio river through this state; with an engagement on the part of the state, that such proceeds of the school funds shall be so applied; and when so applied, shall produce a clear yearly income of six per centum, to be applied exclusively to the support of schools within the several townships of this state.

And they further recommend to the General Assembly an application to Congress, for a donation of the public lands, in aid of the canal, or authority to purchase the Indian reservations for the use of the state.

All of which is respectfully submitted,

T. WORTHINGTON,
BENJAMIN TAPPAN,
JER. MORROW,
ISAAC MINOR,
ALFRED KELLEY,

SATURDAY, January 4th, 1823.

On motion,

Ordered, That 2000 copies of said report be printed for the use of the members of both houses, and that the senate be informed thereof.

HON. JAMES GEDDES' REPORT.

To the Honorable Thomas Worthington, Benjamin Tappan, Alfred Kelly, Ethan A. Brown, Jeremiah Morrow, Isaac Minor, and Ebenezer Buckingham, Esquires, Canal Commissioners.

GENTLEMEN,

An account of "the surveys, and examinations of the country between Lake Erie and the Ohio river," which have been made in pursuance of your directions from time to time given, is presented in the following report:

Examination of the route, by the sources of the Mahoning and Grand rivers.

This route is much the shortest, that can be found between Lake Erie and the Ohio river, would require less lockage than any other; and less labor in the construction of a feeder. The summit between the rivers, in a swamp five miles northwest of the village of Warren, is but 342 feet above the level of Lake Erie, and probably not more than 224 feet above the level of low water in the Ohio river, at the mouth of Big Beaver. The summit level of this route, passing through a black ash swamp, the surface of which being on one level for some miles, little could be calculated on by cutting down to save lockage; as the deep cutting would extend to so great a distance.

If the dividing ground between Grand river and Ashtabula river will admit of the canal being led to the mouth of the latter, the route will be much shortened thereby.

A feeder to this canal, can be drawn from the Cuyahoga river, in the northwest corner of the township of Hiram, by means of a dam and an artificial cut of 75 chains in length, into the head of Silver creek and conducted thence to the proposed summit as represented on map No. 1. The deepest part of the above artificial cut would be near 16 feet. A dam on the Cuyahoga must be raised six feet, which is as much perhaps as the low country, lying on the margin of the stream above will admit of.

Whether the Cuyahoga in the township of Hiram, is sufficient for the supply of the summit pound of a canal, is not well ascertained; but from the best information obtained, it is probable. It is said that the water from below Parkman's mills, in Geauga county can be readily brought over to Silver creek.

As part of the route of this canal must lie without the bounds of the state of Ohio, and the canal if made, benefit but a small part of the state, little time has been given to its examination.

The country along the Cuyahoga, which is so well accommodated with mills of every kind, would suffer much by the diversion of this stream from its present bed.

Route by the sources of the Cuyahoga river, and Tuscarawas branch of the Muskingum river.

The waters of the Tuscarawas and Cuyahoga divide in an extensive wet swamp, in the north end of which is a small lake emptying its waters into the Cuyahoga. From the south end of the swamp small streams run into the Tuscarawas, which stream has a mill dam erected thereon, near the swamp. The bed of this dam corresponds almost exactly with that of the above lake.

The highest part of the swamp above said level, is above 4 feet and is elevated 404 feet above the level of Lake Erie; and may be estimated at 428 feet above the level of low water, at the mouth of the Muskingum. It is probable that 6 or 7 feet of this summit might profitably be cut down to save lockage.

The Tuscarawas stream, and the waters of the little lake, in the swamp, is the only supply that can easily be brought into the summit pound here proposed. The furnace brook from the furnace pond, which is 16 feet above the level of the lake in the swamp, may be brought; the most serious part of the expence being a deep cut near the furnace village. This deep cut would be in an open swamp, from both ends of which, small streams issue. The deepest part of the cutting is 33 feet; and over a mile in length, from a depth of 6 feet at one end, to the same depth at the other end. From the west end of this cutting, the water would follow the natural channel of a brook to Faylor's mill pond, which is 11 feet higher than the little lake, in the swamp; and between said places, the ground is favorable for an artificial cut. But when done the consequence would be ruinous to the many valuable hydraulic works, which are supplied with water by this excellent little stream. A lively little manufacturing village, at this place, would in a measure be made desolate. For this brook would be indispensable to the canal, almost the whole of the navigating season; the other aids being altogether insufficient alone. There is another reason why the furnace brook ought not to be taken to feed the canal. In less than the third of a century, perhaps, the tonnage moving on this canal, would require more lockage water than could be supplied without resorting to the Cuyahoga river. And as this river would be sufficient without the furnace brook, and affect the country much less by being diverted from its natural bed, it would be a better calculation to abandon the furnace brook for the Cuyahoga river in the outset. A feeder from this stream at Kelsos mills, in the township of Stow, as far as the furnace village, would be $7\frac{1}{2}$ miles long, and pass over a country of most irregular formation; the side of most of the hills as steep as the earth can stand; making it impossible to carry the feeder in any place along the face of them. A building up from the bottom or cutting down from the top, would be indispensable, wherever the feeder ran on the face of these steep slopes. A very costly aqueduct must carry the feeder over the brook, in the furnace village, to make way for which, some buildings would have to be removed. The top water line of this aqueduct would be 8 chains 75 links long, and $28\frac{1}{2}$ feet above the rocky bed of the brook. Excellent materials for building are on the spot; and a fine rock fountain. In leading a canal from the summit to the mouth of the Cuyahoga river, difficulties of some magnitude must be encountered. The west side of the valley is the best, as there are but two places on this side, where the river, running at the foot of high precipitous hills, would require the making of new channels for the stream, that the canal might occupy the present bed. Following the high land, on either side of the river, is rendered altogether impracticable, by the many deep ravines, through which every stream enters from either side. The harbor at the mouth of this river, is spacious; and probably, can for a moderate sum, compared with the object, be made safe and easy to enter in all kinds of weather. The village here occupies a pleasant and healthy situation.

From the summit down the Tuscarawas valley, the shores are irregular, as far as the village called Newportage; thence down stream following its east side, the ground is favorable, and the descent of the valley very moderate, for some distance; but after the junction of the Sandy creek, Sugar creek and Still Water, the stream is enlarged to a river, with an increased descent, exhibiting in flood time a boisterous torrent, overwhelming the low grounds, scooping them into hollows, and throwing them into heaps, rendering it altogether impracticable to make a canal on the alluvial bottoms, through which the river runs. From New Philadelphia downward, the west side is the most feasible. At Bakers mills, nearly opposite New Philadelphia, is a rocky point near five chains in length. The hill is high and rocks large, but the stone suitable for hewing. Above Schœnbrun 1½ miles the river runs at the foot of a lime stone hill, not high nor very steep, four chains long in one place, and in another three chains; thence pretty favorable until near Gnadenbutten, where there are ten chains of rocky precipice. Here the canal must be protected from the river flood by a stone wall, high enough to maintain the level of the plane below; over which the canal must pass, as considerable distance will be saved thereby, and much better ground obtained. A high point of clay hill, nearly opposite Gnadenbutten, will require the removal of many cubic yards to reach a yard forward. Nothing remarkably formidable exists between this hill point and Neighbortown; and for two miles below, where commences a tract of two or more miles in length, remarkable for slips, some of the size of a quarter of an acre. "Slips are among the most formidable accidents to which canal works are liable, and can hardly be too much guarded against." Opposite White-Eyes falls is a hill, not high but stony. Extensive inundated flats lie at the junction of the Tuscarawas and Whitewoman, extending up to and above the mouth of Mill creek, a short distance below which is the best place for the canal to cross the mouth of Whitewoman.

Route by the sources of the Black river, and Killbuck branch of the Muskingum river.

The greatest depression in the ridge, which divides the Erie and Ohio waters, that can be found any where in the state, is at this place. A Cranberry marsh, surrounded by a border of wet timbered land empties into the Black river by two streams, and also by one, into the Killbuck. This swamp contains 1400 acres, and the highest place in the untimbered marsh, is elevated above the level of Lake Erie 337 feet; and to save lockage, may be down with advantage, perhaps to 330 feet. The valley of the Killbuck, is, in many particulars, remarkably favorable to the project of leading a canal through it; the descent in the whole length of it is very gentle; and the low lands which are almost every where wide, can but in few places, be called alluvial; covered generally, with beach and sugar maple. The inundations cover the flats but a few feet in depth, owing to their width, and the total absence of any large streams falling into the valley; wide spread, and with a declivity so gentle, the floods move placidly along, threatening no disaster to any erections connected with the stream. The high rocky points, that in a few places have the streams running at their base, are shown on map No. 2. In these places, a new bed for the stream would be required, as the canal must occupy the place of the present water course.

The Black river runs in a valley, not unfavorable to the making a canal in it, until it reaches Rawson's mills, where the valley disappears and the river makes its way through a bed, which it has scooped out of an extensive plane; and here the canal ought to leave the stream and pursue on the east side, a route sufficiently distant from it to avoid the deep ravines, through which all the small lateral streams run, as they approach the river.

This distance from the river ought to be pursued to the lake, as the valley of the stream below the falls is very unfavorable for a canal.

A harbor for lake vessels, and canal boats to meet in, and in the vicinity of which, a healthy and eligible site for a city, may be found, will perhaps, with difficulty be obtainable in the place where it would be wanted, in the event of a canal being made on this route.

To supply the summit pound of this canal with water, presents a difficulty which is a draw back on all the advantages enumerated. Nothing short of the Cuyahoga river can furnish a sufficient supply. To the extensive feeder required to bring water to the Cuyahoga and Tuscarawas summit, must be added a feeder from said summit to a branch of the Killbuck, as represented on map No. 2.* making a distance from the place of leaving the Cuyahoga river, to where the water would enter the canal, of near 50 miles; 39 miles of it an artificial cut. The $3\frac{1}{4}$ miles, preceding the entrance into the Killbuck branch, would be a deep cutting all the distance, in a wet swamp, the deepest part 13 feet; and may be estimated at an average of 10 feet for three miles. Allowing a bottom 15 feet wide, with a slope to the sides, of 18 inches base, to one foot perpendicular, the cubic yards to be moved would be 175,977. Put this muddy excavation at 14 cents per cubic yard, and the amount would be \$24,637. Set the remaining $26\frac{3}{4}$ miles, between this deep cutting and the Tuscarawas and Cuyahoga summit, at the ample sum of \$5,000 per mile, making the sum of \$133,750, and the whole 42 miles would cost, say in round numbers \$160,000. But notwithstanding the enormous cost of this feeder, this route will cost less than that of the Cuyahoga and Tuscarawas.

When it is considered that there is about 24 miles more canal to be made from the point of junction, on the Whitewoman, to Lake Erie following the Tuscarawas route, than the Killbuck route would measure; and that there are 134 feet more more lockage on the former, it results that a first cost of much more than \$100,000 would be saved, by making this very long feeder, instead of following the Tuscarawas and Cuyahoga route. The travelling forever, 24 miles further, and the time consumed in passing 16 extra locks, with the repairs of said locks, cost of toll houses, pay of lock keepers, &c. are subjects about the value of which, the best informed might disagree; but the sum would be such as not to be lightly regarded.

From Coshocton to Zanesville the valley of the Muskingum may be pronounced favorable, but from thence to the mouth of the river, most accounts agree in representing it nearly impracticable to improve the navigation by a side cut. Locks and dams, as has been done on the river Schuylkill, will probably be the plan here pursued.

The surface of the Whitewoman, one mile below the mouth of Killbuck, is 48 feet lower than the level of Killbuck and Black river summit; considering said summit as cut down to within 330 feet of the Lake Erie level. This level of the Whitewoman, may be preserved to the Great Falls above the mouth of Tomaka.

Although a canal through either of the three routes above described, is practicable, one only can be made; the supply of water for all being from the Cuyahoga, which is insufficient for more than one.

Route by the sources of the Maumee and Great Miami rivers.

Near the road, about three miles north of Fort Loronies, is the separation of the Maumee and Miami waters. The fall southward from the summit to the surface of Loromies creek at the fording place is 29 feet. To the north

*This additional feeder commences at the Tuscarawas and Cuyahoga summit, and follows down the Tuscarawas valley and up that of the Chippewa outlet, and over to a branch of Killbuck.

the fall is more rapid, being 124 feet to the surface of the stream to Fort St. Mary's. The dividing ridge, between St. Mary's river and the Auglaize river, is (on the road to Fort Amanda) nearly 100 feet lower than the summit; leaving no obstacle to the carrying a canal over into the valley of the Auglaize.

The Maumee and Miami summit is 399 feet above the level of Lake Erie, and with a little cutting down, may be made to correspond with the level of the mouth of Indian creek, on the Great Miami. There is reason to believe that a lower place, than the one here mentioned, may be found, on the dividing ridge. It is most likely to be found west of the road. Cutting down here, would not only save lockage, but lessen the long embankment at Loromies creek; and effect the taking in some valuable springs below the mouth of Indian creek. If the earth is found easy to move, 12 or 14 feet may be cut down profitably on this summit. The Loromies embankment, 129 feet high, would lose near half its height and more than three fourths its length. Passing the points of high land between Loromies creek and Turtle creek, and between said creek and the Miami river, will require deep cutting; and Turtle creek probably a large embankment.

From the best accounts received of the durability of the Great Miami, there is great reason to hope that there will always be found at the mouth of Indian creek, water sufficient to supply the summit level of a canal. The difficulty of giving any descent to the water in a feeder, at this place, will require the cross section to be of such size that it will necessarily be a navigable feeder; and if, from the practice of irrigation or any other casualty, water should ever fail in this canal, a copious supply can be drawn through a feeder from Mad river, as traced on map No. 3.* If it should be satisfactorily ascertained that the Great Miami will always be sufficient for this summit pound, the canal may be carried easier, on the west side of the river through Piqua and Troy, as represented on map No. 3; but if this is considered doubtful, or it shall be found that the waters of Mad river will be needed in the upper level, then said level supported on a high arch, should be carried in an aqueduct, over the Miami at the high rocks three miles or so, above the mouth of Loromies creek, and the same level kept up to the valley of Honey creek, there receiving the waters from Mad river into the summit pound.

The high rocks, are masses of limestone reaching some chains up and down each side of the river, perpendicular, about 20 feet high and nearly 100 feet apart. The river at this place would probably be full 50 feet lower than the canal level, and the embankments at each end of the aqueduct, of pretty formidable dimensions. A canal on this route, will be longer than any of the others, and the amount of lockage much greater. Supposing the summit cut down to 383 feet above Lake Erie level, and the descent to the Ohio, at Cincinnati, estimated, at 434 feet, it would make 917 feet lockage. The adventurer, who is about to vest his funds in such stock will wish to learn every thing relating to a formidable rival, the Wabash and Maumee navigation. From the levels taken, it results that the surface of the stream at Fort St. Mary's, is but 278 feet above the level of Lake Erie, and the fall thence to Fort Wayne, is variously estimated, from 50 to 80 feet. Say that it is 48 feet, and 16 feet off for rising to the summit between the Maumee and Wabash; and said summit will thus stand but 246 feet above the level of Lake Erie, 91 feet lower than the lowest summit in this state. It is a cheap navigation, but by no means a perfect one, that may be expected on these streams. A canal by the rapids near Fort Meigs and a canal from Fort Wayne to the mouth of the Mississinnawa, opens at the expence of a small sum, a communication between Lake Erie and the Ohio river; considering its value cheaper than any other that can be opened.

*This feeder would leave the Mad river a few miles below the bridge west of Urbana.

Route by the sources of the Scioto and Sandusky rivers.

These streams have their sources almost wholly in the country of prairies, than which, a more unfavorable tract for the production of durable water does not exist in the state. Brooks impassable, at one season, are totally dried up at another. These prairies once wet, rain can no more penetrate them than the roof of a building; it slides as effectually off them, and passes away into the rivers, leaving nothing but stagnant fens, in time of drought.

In the broken lands about the sources of the Whetstone, rise perennial springs, which are of sufficient elevation to be brought into the canal proposed to be made here.

The Whetstone waters, after passing the mills of Mr Royce on the east branch, and those of Mr Mosier on the west branch, arrive in a tract so permeable to water, that very little in the driest seasons, reaches the mills of Mr Cole below the forks; it will be, therefore, important that these streams be turned into an artificial cut, before they leave the tract of water tight soil.

The Great Miami has its source in a country, the formation of which, is very favorable to living springs.

The vicinity of Belle Fontaine and Solomon's town, is uneven oak land, a small tract of which produces so much water, that the Great Miami below Stoney creek, is at all times a large stream, compared with the extent of country that it drains. By a level carried from Roundhead's town southward, it appears that the tract, above described, is much elevated above the prairie, where the Scioto runs. Following the road southwardly, from Roundhead's town, 30 feet is immediately risen to an extensive table of land, over which branches of the Great Miami river run southeastwardly. The dividing ground between the Miami and Scioto waters is an extensive marsh, in which is probably mingled the waters of both streams. See map No. 4.

The elevation, above the Scioto, of the most northern stream of the Miami is 23 feet, and the great marsh through which this stream runs is probably, in its highest part nearly on the same level. The next stream passed over (or main branch of Miami) is above the Roundhead's town level 37 feet, Cherokee run remarkable for its durability, 100 feet, and Col. M'Pherson's spring 93 feet. This levelling shows with what facility the Miami main stream and Cherokee run may be turned into the Scioto, and that the most valuable branches of the Buckingelas, if needed, may in all probability likewise be brought in. To get satisfactory knowledge of the facilities and difficulties attending the making this feeder would require examinations with the level, which would consume more time than could then have been properly bestowed on it. A further examination of this interesting object ought to be at a time of low water, when the streams could also be gauged. The waters, thus brought into this valley will as it comes down the hill into the Scioto, make one or two good mill seats in a country to which nature has denied such benefits; and in the Scioto river below, advantages of the same kind will likely be realized. To make this plan perfect an artificial channel must be made to convey the water by the great marsh, which lies between Roundhead's town and Fort M'Arthur. Into this wide spread wet prairie the water is now diffused, and chiefly evaporated in a time of drought.

From information received as to the size and durability of these streams, it is highly probable that the additional supply of water, that may be thus obtained, with the Sandusky, and with the proper management of the Whetstone waters, will be an ample sufficiency for the summit pound of a canal. All attempts to bring the waters of Mad river into the valley of the Scioto, have proved ineffectual. The extensive wet prairies, the sources of the Darby, Deer creek, the Little Miami and the branches of Paint creek, lie on

a high table of land elevated generally about 200 feet above the level of the Sandusky and Scioto summit. The rains which slowly percolate through the surface of these prairies, appear to produce copious springs in the valley of Mad river, and none in the valley of the Scioto, doubtless owing to the dip of the strata underlaying this high table.

The grand ridge dividing the waters of Erie and Ohio, at the head of Sandusky and Scioto valleys, has its greatest depression at the head of a branch of the Tyamochte, the level of which is 11 feet higher than the mouth of Rush creek, and cuts the surface of the Scioto about three miles above the mouth of said creek. Notwithstanding the extent of level prairie, that must be dug through on the summit, there is little doubt that it could be cut down, perhaps 8 feet, with advantage. The Scioto feeder would then start from the mouth of Rush creek with a small dam, taking in that little stream. The embankment over the Little Scioto, would be by said cutting down, reduced to a mere trifle, and some valuable springs on the Sandusky would be thus brought into the summit pound and sixteen feet of lockage saved.

The feeder from the Sandusky river, if the summit level of the canal can be conducted as marked on map No. 4, will not exceed 6 or 8 miles in length. A dam of 8 or 10 feet high, on the river, may be necessary to collect and convey to the canal the valuable springs that rise on the south or southwest side, above the Croghansville road. If it should unfortunately so turn out that the ridge between the Sandusky and Tyamochte valley, by its elevation would hinder the bringing the summit level over it, short of Upper Sandusky or Negrotown, this feeder would be expensively lengthed thereby. The Broken Sword creek yields but little water, in a dry time, in its present situation; but as a dernier resort for the expence would be great, it may be made to bring the waters from Richland county, which spread themselves into, and are lost in the great marsh in a dry time, and in time of flood run down the Broken Sword and Honey creeks into the Sandusky and by New Haven down the Huron river. An artificial cut, carried along the south edge of this marsh, at the foot of the high ground, from which the streams issue, would convey their collected waters to the Broken Sword creek; after following the natural bed of which, to a proper place for the beginning of an artificial cut, this new stream might be conducted to the Sandusky river above the proposed dam. The great marsh is elevated above the level of the proposed summit, something over 46 feet.

A level from Owl creek above Mount Vernon, has been carried down the north fork of Licking and connected with the level brought from Lake Erie down the Killbuck and up to Newark; from which it results that Douglass' dam above Mount Vernon, is 430 feet above the Lake Erie level.

A level from Newark, to the summit between the south fork of Licking and Little Walnut, makes that summit 346 feet above the Erie level. By taking the water out of Owl creek (as shown on map No. 4,) it may with some deep cutting, be carried over into the north fork of Licking; and about twelve miles above Newark, an artificial cut may be commenced, which will have sufficient elevation to convey these accumulated waters, through the valley of the south fork of Licking over into the Little Walnut, carrying with them the racoon fork; one of the most durable branches of that river.

This summit, at the sources of the Little Walnut and south fork of Licking, exactly corresponds in elevation, with the Sandusky and Scioto summit, when the latter is cut down the 8 feet above proposed. Now if the country would admit of carrying a level canal between these two points, as traced on map No. 4. (and from the levels made, there is some reason to expect that it is practicable,) the Owl creek waters might be carried to the Sandusky bay; bringing tributaries to the summit pound from Roundhead's town and from Mount Vernon; places nearly 70 miles apart in a direct line; laying under

contribution, for feeders to this canal, the Miami, the Huron and the Muskingum rivers; besides the Scioto and Sandusky.

A branch canal might thus, without making any new summit, be carried to the Muskingum river. And when the mineral riches of that valley, in coal, iron and salt, are considered; likewise its hydraulic advantages, and every thing that can promote the growth of large manufacturing establishments, is it extravagant to say, that such a branch would be well worth its cost, and that at no distant day? The fall from said summit to the mouth of Tomaka, is 197 feet. Owl creek is one of those streams from a hilly country, which are so remarkably durable.

A branch canal to the Muskingum, should the above prove impracticable, might be carried up the valley of the Little Walnut, from a level hereinafter described, as passing from Bigbely by Circleville. This route would require 413 feet of lockage. A branch with all this lockage, might cost less than the above serpentine route.

From the summit to Lake Erie, the country is very smooth and even on the west side of Sandusky river; Tyamocte valley and Wolf creek present the only apparent difficulties; and these streams run so near the general surface of the country, that little is to be apprehended from them.

Water to supply soakage and evaporation, in the lower levels, must be obtained by carrying down the first locks from the upper pound to a place in Sandusky valley, where water from that stream can readily be brought into the level below said locks. There are places, particularly at Fort Ball, where the water from this river can be taken through feeders of no great length into the canal. For the purpose of thus obtaining water the canal cannot be led far from the river, whichever side of the valley may be pursued. But if the canal is carried down the west side of the river, where will be the harbor for Lake vessels and canal boats to meet in? The deeply laden canal boat cannot make its way through Sandusky bay; nor can the Lake vessels come to Lower Sandusky. Conducting the canal to the mouth of Carrying river has been proposed; to which it is objected that there is no suitable healthy situation there for the great Emporium, that ought to grow up in such a place, and that there is no other way than carrying it down the Sandusky river and along the bay to Portland, [Sandusky city.] This will require examinations minute and extensive, as neither cheapness of execution nor shortness of distance ought to stand in the way of placing said city in its proper place.

From the summit towards the Ohio river, all must be conjectural, or nearly so, as far as Columbus.

To carry the canal over the valley of the Little Scioto, in the place represented on map No. 4, will, doubtless, require a costly embankment; and it may be a better calculation to cross the valley much further up; although at the expence of adding some miles to the length of the canal.

As to the crossing the ridge, between the Scioto valley and Whetstone, or crossing that river, or the ridge between it and Alum creek, at the places where the canal is laid down on map No. 4, there has been no guide but the conjectures of persons acquainted with the country; and these conjectures may turn out to be very erroneous.

Bringing the summit level of the canal over the ridge to the valley of Alum creek would be very desirable for the purpose of conveying water from said creek to supply the soakage and evaporation, that may take place in the long level, that probably, will be carried down the west side of the valley of Alum creek towards Columbus.

The Alum creek, like the Whetstone, looses its waters in a porous soil, after leaving the uneven country, in which its sources spring; and if not drawn upon as a feeder pretty high up, will not be worth taking; and it is the only supply that can be obtained until the canal arrives at Bigbely.

Another route may be found, the only practicable one, to wit: A route pursuing the valley of Scioto and locking down occasionally, to situations where feeders can be brought from the river to replace water wasted by soakage and evaporation. Following this route, it might be found difficult to conduct the canal to the plane, where the town of Columbus stands; the lowest part of which plane being 57 feet higher than the level of the river surface opposite. A very expensive aqueduct and embankment would probably be required for crossing the Whetstone, where its valley has become so wide and deep; expensive when compared with the crossing said stream at the place where the summit level would pass over it. From Columbus southward, the canal ought to pass on towards the valley of Bigbelly, and cross it at, or above the point marked A, on map No. 5. At this point, the surface of the stream is as high as any part of the road, over the ridge between this stream and the Little Walnut. Therefore a dam may be used, if the making of an aqueduct be found inconvenient. The Little Walnut at the post road, is 39 feet lower than the level of Bigbelly at A,* and ought to be crossed with an aqueduct.

If the same level of the Bigbelly, at A, can be carried over the valley of the Little Walnut, (which above Miller's mill dam, it probably may) this level could then be pursued east of Circleville, over very smooth ground to the valley of Sippo. The Sippo and Congo and Blackwater valleys will require expensive enbankments and large culverts. The country from Kinnikinnik creek to Kilgour's plane, will present many difficulties, on steep sidelying ground, particularly about half a mile in length of high precipitous hills at Hough's mills. A level high enough to pass over the planes at Kilgour's must be commenced as far north as Kinnikinnik valley. This stream ought to be let into this level as a feeder. At Hough's mill pond, the river surface is 33 feet below said proposed level. Here the east bank of the river is a high perpendicular rock, of argillaceous slate; but this high level would pass altogether above the upper surface of the rock.

This difficult tract between Kinnikinnik and Kilgour's plane, may possibly be shunned by starting a level high up Alum creek and carrying it over the summit between Kinnikinnik and Dry run. This would lead the tract of the canal far up the valley of Bigbelly and Little Walnut; and in all probability, greater difficulties would be encountered, than those sought to be avoided.

The surface of Kilgour's plane, being gained, all is favorable as far as Salt creek. This creek will be crossed by an aqueduct and embankment, probably of considerable magnitude, when all is easy to Carr's run, where will be required a large culvert and a pretty large embankment. Nothing worthy of the name of a difficulty, new occurs before the arrival at Sergeant's mill. Here the river runs for 15 chains at the bottom of a steep high hill. By carrying the level of a pretty high embankment at Carr's run on to this plane, the hill will be easier cut down from above, than if passed with a lower level. No more such instances occur between this and Portsmouth; several brooks are to be crossed, the most notable are Beaver brook, McConnel's run and Kroniger's run, all of which are formidable in time of flood and yield little water in a drought. A supply of water may be taken into the canal at Salt creek; but an additional supply ought to be had between Piketon and Portsmouth. The streams from the hills are numerous, and if each would afford but a little water, a sufficiency might be calculated upon; but it is said that many of them dry up altogether every autumn. To take a feeder from the Scioto river may be found feasible.

*In section 23, township 4, range 22.

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY, BY JOHN KILBOURN, AT \$3 A YEAR. IN ADVANCE.

VOL. I. COLUMBUS, OHIO, SATURDAY, JULY 12, 1828. NO. 4.

Readers will notice that the Canal Documents are continued on the third page of every number, from the last page of the preceding number.

HORIZONTAL WATER WHEEL.

The subscriber in the year 1809, invented a water wheel, very simply constructed, and operating upon principles believed to be entirely new. For proof of the authenticity of this statement; or at least of my having then exhibited my model thereof to him, reference is made to Mr James Dean, a very learned and scientific man, and professor of Mathematics and Natural Philosophy, in the University of Vermont, at Burlington, Vt. The principle would apply equally to a wind, as to a water wheel. Indeed the first model, which I made, was adapted to wind:—and in this element, its success equalled the most sanguine expectation. A model of each kind, can be seen at my office.

This water wheel is not, however, deemed to be of much utility, excepting upon large rivers, having a tolerably swift current, say four miles an hour, and a volume of water of such magnitude as to prevent the practicability of building a dam thereon. For the lower part of the Ohio, and on the Mississippi rivers, and also in tide waters, it is believed that its utility would be obvious, upon experiment.

It is not very easy, minutely, to describe it in words; but the principle is that of upright moveable floats, set in two horizontal plank wheels or rims attached to an upright shaft; the floats being inserted, both at top and bottom, by round tennons, into and near the outer edge of the two plank rims or wheels aforesaid, and suffered to play inward and swing downwards with the current, on that side of the wheel moving up against the current, so that nothing but the edge is presented to its resistance; while on the opposite side, by the time they successively arrive at the point directly up stream from the upright shaft, the floats are obstructed in their further revolution, by rods connecting the upper and lower rims with each other; so that they present, on the descending side of the wheel, their complete broad side to the current.

One excellence of this wheel is its peculiar property of never being retarded by back water: but will revolve equally well, with a flood of fifty feet deep, over it. And, indeed, to obtain its utmost velocity and power, it must be completely submerged, having the water running all through, around, beneath and above it.

Actual experiment shows that this is a very powerful wheel. On the top of this upright shaft, (which must be long enough to rise above

the highest floods,) is attached a horizontal cog wheel; which also connects with and turns another, fixed to an horizontal shaft, running on to the adjacent shore or land, where it can be made to propel any kind of mill or machinery, which may be required.

Any person, who will build a mill or mills upon this principle, within a reasonable time, say two or three years from this date, shall have my full liberty, therefor, without any compensation for my right of invention.

JOHN KILBOURN.

Columbus, Ohio, 10th July, 1828.

To illustrate the several Canal routes, I have been at the expense, of inserting a miniature map of the state of Ohio, on which are delineated the main Ohio canal from Cleveland to the Ohio river; including the route of the lateral canal or feeder to Columbus—and also the Miami canal, from Cincinnati to Dayton. They are designated by double lines; while the roads are indicated by single lines.

These maps sell, by the quantity, at 12½ cents each. But I take a pleasure in furnishing them gratuitously to present subscribers, for this paper; although nothing of the kind was promised in the prospectus.

It appears, by an advertisement in an eastern paper of one Jared Strickland of Glastenbury, Connecticut, of the 24th June last, that he has invented a *cast iron nail hammer*—and that it is coming into extensive use.

By a notice, in a Boston paper of the 1st inst. it appears that a man there, "has established in that City a *Patent Machine for Sponging CLOTHS AND CASSIMERES*, in a mode recently invented, and highly approved in the principal cities of Europe, and as far as known, in New York and Boston. To *Merchant Tailors* it offers a great advantage; enabling them to dispense with a troublesome process at their Boards, while the Cloth sponged by this Machine retains the lustre and beauty of the original finish (which cannot afterwards be removed even by the application of hot water) and, of course, appears much handsomer when made up. To the public in general it is offered as a great improvement, with full confidence that it will very soon come into general use, and be found to combine, in this effect, elegance and economy."

Caledonian Canal.

This work is, perhaps, not surpassed by any thing of the kind in the world, and connects the Northern Ocean, at the mouth of the Murray Frith, with the Atlantic, at Fort William, beginning at the Murray Frith, where there is a sea lock of 170 feet long, 40 feet wide,

and has a lift of 8 feet. Opposite the town of Luverness, there are 4 locks of 8 feet lift, which raises it to the level of Lough Ness; then, by a canal 6½ miles long to Lake Darfour, which is 1½ miles long, and has from 5 to 91 fathoms water. The entrance to this Lake is secured by a regulating lock; thence, by Lough Ness, 22 miles, with a depth of water varying from 5 to 129 fathoms, and without a rock or shoal. At the south end of the lake, the canal crosses part of the Glacia of Fort Augustus, and ascends 40 feet, by 5 locks, to the level of Lough Oich, which is about 5 miles in length, and ¼ of a mile in width. This lake is a summit level of the canal, and is 94 feet above the level of the sea. From Lough Oich, to Lough Lochey, a distance of 2½ miles, the digging is 40 feet deep; near the end of this deep cut, is a descent to Lough Lockey of 9 feet, by two locks, one of which is a lift of 7 feet, and a regulating lock having a lift of 2½ feet. The surface of this lake is raised 12 feet above its original level, to avoid excavating rock. From Lough Lockey, to Lough Eil, is a descent of 64 feet, by 9 locks, one of which is a guard or regulating lock; thence to the Atlantic by three locks, which descend 22 feet 9 inches. The locks are 170 and 180 feet long, 40 feet wide, and have 20 feet water on the sills: the width of the canal is 50 feet at bottom, and 120 feet at the water line, and 20 feet deep. The lock gates are plates of cast iron, 4 inches thick, and form segments of a circle; and each pair of gates weighs about 200 tons; they work on wrought iron rollers, and are opened and shut by machinery. The whole length of the canal is about 69½ miles, 30 of which is excavated, and 39½ through deep lakes. Cost, one million of pounds sterling. Engineer, Mr. Telford.

Nat. Int.

FARMINGTON, (Conn.) June 23.

On Friday last was launched the first Canal boat which was ever seen at this place. An event so novel as the opening of a navigable communication between this ancient town and other distant places, and the appearance on our canal of a vessel sufficiently capacious for the reception and conveyance, even of hundreds of persons, could not fail to interest and collect together a multitude of spectators.—The launch took place about 4 o'clock, P. M. About 5 o'clock, four large and beautiful gray horses, handsomely caparisoned, and rode by boys in white dress, were attached to the boat, when under a salute of artillery from a neighboring hill, and cheered by the animating air of Hail Columbia, from the accompanying Phoenix band—a select party of about two hundred gentlemen and ladies embarked, and proceeded northerly about three miles. During the passage they partook of various refreshments provided for the occasion.

From the Register of Pennsylvania.

Bridges.—The numerous bridges which have been created over almost every stream in Pennsylvania, have given it the title of the "State of Bridges." It is impossible to procure a list of their number. In that portion of the state which is east of the Allegheny

mountains, these structures are usually composed of stone; with few exceptions they rarely exhibit any pretensions of architectural beauty. Hydraulic line has not been employed in them for cement, but in a very few instances: hence, they are exposed to injuries which render frequent repairs necessary.

Some of the county bridges have been constructed at an expense of 30, 40, and even 60,000 dollars. It is not, however, a part of our design to describe the works of internal improvement which have been effected by the counties. Our limits will permit us to make only a few remarks on the bridges erected by corporations. Sixty-one companies have been incorporated for this purpose, and 49 bridges have been constructed by those which have gone into operation at an expense of about \$2,500,000.

The Schuylkill permanent bridge, as it is commonly called, was the first great structure of the kind attempted in America. It was erected by a company incorporated in the year 1798. The foundation of the western pier is upwards of 40 feet below the level of the surface of the river; no bridge in modern times presents a similar instance; the difficulties were finally subdued; and the structure, with its appendages, completed at an expense of 300,000 dollars.

The Lancaster, or upper ferry bridge, which is situated in the vicinity of that which we have just mentioned, is composed of one arch; the cord of which is 348 feet 6 inches! a span exceeding that of any bridge of ancient or modern times. (The bridge of Schaffhausen, respecting which there has been so much dispute, we believe, was supported by the pier in the centre of the Rhine. It is, however, no longer in existence.)

In 1816-17, a bridge suspended from iron wires, forming a catenary curve, was built over the falls of Schuylkill,* near Philadelphia. The success of this novel enterprise led, at a very recent period, to the introduction of bridges constructed in a similar manner in Europe, where the experience of their economy has occasioned their multiplication. Chain bridges which have since been constructed so frequently, were introduced at the same place, several years prior to the commencement of these structures in any part of Europe.

The wooden bridges of Pennsylvania are unrivalled in number, in magnitude, and in scientific boldness of design. They have been adopted as models for similar structures in several parts of Europe where timber bridges are required.

* By White and Hazard.

By a gentleman just returned from Chilli-othé, we understand that the canal commissioners have determined to locate the line of the canal, southwardly from that town, all the way to the mouth of the Scioto river, upon the west side thereof; until arriving near its mouth, where it is to cross, on a dam, into the town of Portsmouth, where it will enter the Ohio river.

Both Sandusky and Scioto valleys may be pronounced favorable to the conducting a canal along them, when compared with the valleys of most other rivers; and very favorable when compared with the valley of the Mohawk, in the state of New York.

The particular advantages possessed by said valley, is the facility with which the canal in most places may be led along a level altogether above the alluvial bottoms on the margin of the rivers, entirely secure from floods so menacing to the canal works on the Mohawk river. The total absence of large lateral rivers is an advantage worthy of note; the Bigbelly, Little Walnut and Salt creek being the most formidable; each of which drains comparatively a small tract of country.

The summit pound, on this route, when cut down as proposed will be 346 feet above the level of Lake Erie; and 447 feet above the level of low water mark at the mouth of Scioto river; making the whole lockage 793 feet. Following the meanderings of the valleys on a map the distance is 207 miles from the mouth of the Scioto, to the mouth of Carrying river; and a canal might possibly exceed this distance but very little.

All of which is very respectfully submitted,

By your humble servant,

JAMES GEDDES, *Engineer.*

December, 1822.

On motion,

Ordered, That 1000 copies of said report be printed for the use of the members of both houses, and that the senate be informed of the same.

SUPPLEMENTARY REPORT OF THE CANAL COMMISSIONERS.

Mr Worthington on behalf of the board of canal commissioners made a report, which was taken up and read as follows, viz:

The commissioners appointed by the act of the 31st January, 1822, authorizing an examination into the practicability of connecting Lake Erie with the Ohio river, respectfully report—

That, for the inspection of the members of the General Assembly, they have deposited in the State Library a manuscript copy of the report of James Geddes, Esq. the engineer, employed by the state; together with maps of the summits of each of the routes which have been examined; which could not be prepared at an earlier day, or they would have been presented with their report of the 3d instant.

The report of the engineer refers to the maps, and without them would not be intelligible. As the commissioners have not the means of having the maps printed, and as it requires much time to execute manuscript maps, they are unable at the present session to have copies prepared. If they could have them printed, it would not be proper to do so at present, for until further surveys and examinations are made, they cannot consider them entirely accurate. They are, however, subject to the direction of the General Assembly. The commissioners would do injustice to their feelings, if they did not avail themselves of this opportunity of bearing testimony to the integrity, ability and industry with which Mr Geddes has discharged the important duties committed to him. Upwards of nine hundred miles of country have been examined, and the level of nearly eight hundred has been taken with only one instrument in less than eight months. His perseverance and the interest he has taken in effecting objects so important to the state, under all the privations and exposures to which his duties have subjected him, will now and hereafter, when the great work he has commenced shall be completed, be duly appreciated by the people of Ohio. As the location of a canal on some

one, if not all the canal routes which have been reported, is contemplated within the next season, the commissioners consider it their duty to ask of the General Assembly, authority to receive by written conveyances in such form as may be prescribed, donations on any of the routes, of the ground necessary for the canal; and of any other lands which may be given for the purpose of aiding in completing the work.

The commissioners respectfully submit a statement of the expenditures which have so far taken place, and assure the General Assembly that in the discharge of the extensive and important trust with which they have been honored, they have adopted a rigid system of economy in the expenditure of the funds subject to their control. The vouchers for the expences incurred in compliance with the 4th section of the above recited act, are filed with the Auditor of State.

The whole amount of expences incurred under the direction of the commissioners in the performance of the duties assigned them by the law, up to this time is \$2,426 10. The individual expences of the commissioners while engaged in the performance of their duties, are estimated at \$176 49—and the expences of the engineer, assistants, hands, subsistence and implements, are estimated at \$2,249 51. Making as above the aggregate sum of \$2,426 10. The individual expences of the commissioners could not, in all instances be separated from the expences of the levelling party with which they were engaged, but the above estimate does not vary materially from the truth. The commissioners have not charged or received any thing for their time or services.

All which is respectfully submitted,

T. WORTHINGTON,
JER. MORROW,
BENJ. TAPPAN,
ALFRED KELLEY.

January 13, 1823.

AN ACT

Supplementary to the act, authorizing an examination into the practicability of connecting Lake Erie, with the Ohio river by a Canal.

Sec. 1. *Be it enacted by the General Assembly of the state of Ohio,* That the board of commissioners constituted by this and the above recited act, be, and they are hereby authorized to employ such engineers and assistants, as they may deem necessary, to enable them to carry into effect the provisions of said acts.

Sec. 2. *Be it further enacted,* That Micajah T. Williams, of the county of Hamilton, be, and he is hereby appointed a canal commissioner, to serve in the place of Jeremiah Morrow, who declines serving in that capacity.

Sec. 3. *Be it further enacted,* That the canal commissioners, shall be, and they are hereby authorized and required, in behalf of, and in the name of the state of Ohio, to make application to the proprietors of lands, through or near which the canal may, or may be proposed to pass, for cessions, grants, or donations of land, or donations of any kind or description whatever, for the purpose of aiding in the construction of the canal, and to take in the name of the state, such grants and conveyances, as may be proper and competent to vest in the state, a good title to the same, making such conveyances conditioned on the location and construction of the canal, on the route contemplated by the donor at the time of making such donation.

Sec. 4. *Be it further enacted,* That the commissioners aforesaid for the purpose of carrying the act to which this is supplementary, more fully into effect, shall be, and they are hereby authorized to appoint such members of

their board as they may think proper, acting commissioners, not exceeding two, and to allow said acting commissioners, such compensation for their services as they may think right, for the time they shall be employed in the discharge of the duties assigned them by the board: *Provided*, Such allowance shall not exceed two dollars per day each.

Sec. 5. *Be it further enacted*, That the commissioners be, and they are hereby authorized and required, to take the necessary measures, to ascertain whether loans can be obtained, on behalf of the state, for the purpose of aiding in the construction of a canal, from Lake Erie, to the Ohio river; and if so, on what terms and conditions, and to report thereon to the next General Assembly, with such other suggestions and views, as they may think proper, touching a system of revenue, for the above named purpose.

Sec. 6. *Be it further enacted*, That a sum not exceeding four thousand dollars, be, and the same is hereby appropriated, for the payment of the salary of such engineer and assistants as the board of commissioners may employ, to be paid out of any money in the treasury not otherwise appropriated, on the order of the commissioners.

Sec. 7. *And be it further enacted*, That hereafter there shall be a regular and correct account kept, of all moneys expended under the provisions of this act, and the act to which this is a supplement, and the president of the board of commissioners, shall lay the same before the legislature at the commencement of the next session.

JOSEPH RICHARDSON,

Speaker of the House of Representatives.

ALLEN TRIMBLE,

Speaker of the Senate.

January 27, 1823.



Extract from Governor Morrow's Message, of the 22d December, 1823.

No official information has been received from the commissioners for locating a route for a canal from Lake Erie to the Ohio river, relative to the progress which has been made in that work. It is understood that their exertions to procure the services of a principal engineer for the past season, were unsuccessful, and that their operations were much retarded by the unhealthiness of the season. It is certain that the examinations on the contemplated canal routes have not yet been completed. It will become necessary for the General Assembly to provide further means to enable the commissioners to continue the examination; and prosecute it to final effect. In a work of such magnitude as that in contemplation; and requiring so vast an expenditure for its execution; the examination should be made effectual to the ascertainment of its practicability.

Measures have been taken for carrying into effect the provisions of "An act respecting a canal at the falls of the river Ohio;" the difficulty of procuring the services of a skilful and practical engineer, except at a remote distance, and at an expence disproportionate to the extent of the work to be performed, induced the executive to suspend the execution of that act, until an engineer should be employed for the examination of a route for the contemplated canal from Lake Erie to the Ohio river. The nature of the services which the engineer had to perform on that route in the summer of 1822, were such that no time could be afforded for the examination at the falls of Ohio. With a view to the execution of this act, the proposition was made to the canal commissioners at an early meeting of their board in the present season, that the engineer which they should employ for the great work of which they had charge should be left at liberty to contract with the executive for making an examination at the falls of Ohio. But as the exertions of

the board, to engage an engineer, were unsuccessful, the provisions of the act remains yet unexecuted. From information lately received, however, there is ground to believe, that we shall be able in the present month to avail ourselves of the services of an engineer, distinguished for his skill and experience, to make the examination, and if so, a report of the result will be made to the General Assembly in the course of their present session.

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SECOND ANNUAL REPORT OF THE BOARD OF CANAL COMMISSIONERS,
21st of January, 1824.

In obedience to the act of the last General Assembly, supplementary to the act relating to a navigable communication between Lake Erie and the Ohio river, we now lay before your honorable body a statement of our proceedings under that act, and the act to which that is a supplement. In doing this, we state with regret that owing to circumstances which will be hereafter noticed, we have not been able during the last season, to complete the work contemplated by the acts defining our duties, and which was so anxiously expected by the public.

In locating a line of canal across this state from Lake Erie to the Ohio river, it was deemed important by the board that a route should be so selected, as to accomplish the double object, of connecting those great navigable waters and at the same time, accommodating as large a portion of the state, and enlisting in its favor as great a share of public sentiment as possible.—With this view of the subject it was thought advisable to ascertain the practicability of constructing a canal which would unite with the Lake, as near the northeast corner of the state as the nature would permit; and passing through the great vallies of the Muskingum, the Scioto and Miami, in a south westwardly direction, would afford an advantageous outlet to their surplus productions, and communicate with the Ohio near the southwest corner of the state. The great line of commercial intercourse west of the Alleghany mountains being in a northeastwardly and southwestwardly direction, pointing to New York as one of its terminations, and to New Orleans as the other, operated as an additional inducement in favor of this plan.

It had been ascertained by James Geddes, Esq. in the course of his examinations under the direction of the board during the previous season, that the general out line of this plan could be pursued from the Lake as far as the Scioto valley, by passing the Licking and Walnut creek summit; but no method had been discovered of continuing this diagonal line to the Miami valley. Mr Samuel Forrer, whose industry, skill and general information promise him a high standing for usefulness and respectability as a civil engineer, who, and was at that time the only one in our employ, was directed to ascertain by taking the proper levels, whether it would be practicable to construct a canal from the Scioto to the Miami.

From the examinations it was ascertained that the dividing lands between the waters of the Scioto and the Great and Little Miami rivers, were every where higher than the Tymochtee summit, until he approached near the Ohio river; and that no streams affording the requisite supply of water in dry seasons, were sufficiently elevated, to permit their waters to be thrown into a summit pound, with which it would be necessary to pass this high table land. These obstructions to canalling in a country apparently very level, were little anticipated by those best acquainted with its general features although they were found to be insurmountable.

Further examinations in relation to the Sandusky and Scioto route were also made by Mr Forrer, under the direction of the board. By these it was more fully ascertained that most of the head waters of the Great Miami, in Logan county, might be turned into the Scioto near Roundhead's town, and

thence conducted to the Tymochtee summit in the manner proposed by Judge Geddes. These streams, viz: The main branch of the Great Miami, Cherokeeman's run, Buckingclas, and the north branch of Stoney creek, were at that time supposed to be sufficient with the aid of the Sandusky and Scioto, to supply that summit. It was also found that the level of the Tymochtee summit, would not pass the dividing ridge between the Scioto and Whetstone rivers until it had extended ten miles below Delaware.

In obedience to the requisition, of the act of the last General Assembly, surveys were made, by which it was ascertained that a line of canal might be located from the Licking summit to a point near the Hockhocking river at Lancaster. Supplying this line with water may present a question of some doubt, and one which we are not at present prepared to decide.

Pursuant to a resolution of the board, Mr Tappan proceeded early in May, with an engineer, to take the levels from the Mahoning and Grand river summit, in the township of Champion, Trumbull county, to the Ohio river, at the mouth of Big Beaver. From the report made on this subject, it appears that the descent from that summit, to low water mark in the Ohio, is 214 46-00 feet; 157 96-100 of which is the descent from the summit to the head of the falls of Big Beaver, 4 miles 32 perches from its mouth. This summit according to the statement of Judge Geddes, being 342 feet above the level of Lake Erie, it will appear from the above results of levelling, that the Ohio at the mouth of Big Beaver, is at low water 127 54-100 feet above the level of the Lake; and that a canal on this route would require 556 46-100 feet of lockage.

The difficulties or facilities presented to the construction of a canal on this route have not been accurately ascertained; but from the knowledge we possess of the general features of the country through which it would pass, it is supposed that no very serious difficulties will occur, provided the requisite supply of water can be had on the upper levels. This question we are not prepared to determine.

As this route, in part of its course, passes through Pennsylvania; we would recommend the chartering of a company, which may also obtain a charter from the legislature of that state, to execute this work.

Two acting commissioners, Messrs Williams and Kelley, were appointed to superintend and take the immediate direction of the examinations and surveys.

In undertaking a work of so great importance and involving so much responsibility as that of selecting and locating a line of canal from the Lake to the Ohio, it was thought prudent to avail ourselves as far as possible of the knowledge which might be derived from the experience of New York in the construction of her canals. Mr Kelley was therefore directed to proceed to that state in the spring in order to collect such information as might be obtained from an actual inspection of those works, parts of which were then in the different stages of their construction, from the first breaking of the ground to their completion. He was also directed to procure for this state the services of one of their principal and most experienced engineers. This part of the duty assigned him, he was unable to accomplish, owing to circumstances which it will be unnecessary here to detail. Mr Seymour Skiff, a young gentleman of much promise and considerable practical experience and standing was, however, obtained.

Mr Williams also went to the state of New York, in the fall, at a time when no detriment to the service would result from his absence, in order to procure information, particular as to the expenditure of water on various sections of the canals in that state, and as to obtaining funds for the construction of a canal in this state, which was one of the duties assigned to the board. The result of these inquiries will hereafter be noticed.

At the meeting of the board in June last, Mr Williams was directed, with the aid of the engineer, Mr Forrer, to ascertain the feasibility of connecting the Loramies with the Tymochtee summit by means of a navigable feeder. It having been previously ascertained that the Scioto and Miami vallies could not be united by a canal south of the great dividing ridge, or rather table land, on which are mingled the head waters of the streams which flow into the Lake, and the Ohio river; and it being also apprehended that the head branches of the Great Miami united with those of the Sandusky and Scioto, might possibly be insufficient to supply the upper levels on the Sandusky and Scioto route with water, it was thought important to seek some other method by which these objects might be effected. With the view of connecting the Miami valley with the main trunk of a canal line on the Sandusky and Scioto route, and of supplying with water the upper levels on that route, from the Mad and Miami rivers, it was therefore determined to make the examinations now under consideration.

The line run, and the levels taken, agreeably to these instructions, though not completed, shew that the Loramies and the Tymochtee summits may be connected by a canal or navigable feeder, passing north of the Scioto river, on the Lake side of the dividing lands. This line would probably require no locks, between the *two summits*; and the descent would be but* little more than required to give the water the proper current. The length of this line as laid down on the map, is 36 miles; but would be probably increased to 100 miles, by making the curves necessary in location to preserve the level. The ground is considered favorable for the construction of a canal, and the retention of water; but no constant stream worth estimating can be taken into the canal, between the two summits, the line passing generally near the sources of the streams which flow northwardly to the Lake, few of which are durable. The question of supplying with water, this long line of navigable feeder, and through it the upper levels of the Sandusky and Scioto route will be hereafter considered. A summit of ten feet less elevation than that fixed on by Judge Geddes, between the waters of the St. Mary's and Loramies creek, was found in the course of the examinations made in that vicinity.

The board of commissioners at their meeting in June, determined on commencing the location of a canal line on the Sandusky and Scioto route, and on meeting at Lower Sandusky on the fourth of July following. The following considerations led to these determinations: It was at that time believed that the upper levels on the Sandusky and Scioto route might be supplied with water at all seasons, either by the method first proposed, or by resorting to Mad river for a feeder; and that this route passing through a country supposed to be very favorable for canaling, and across the state in a direct line from the Lake to the Ohio, would accommodate the state and unite public opinion better, perhaps, than any other upon which a canal could be made for equal expence. Being compelled, by the result of the examinations before stated, to abandon the diagonal line first proposed, at least that part of it between the Scioto and Miami rivers, the board considered the Sandusky and Scioto route, as, on the whole, standing next in point of cheapness, combined with practical utility. Its general course not only passes through the centre of the state, (measuring from east to west) but through a district of uncommon fertility and capable of yielding an immense quantity of surplus produce for exportation.

In determining on the location of a canal route, the members of the board have uniformly felt disposed to yield something of their local sentiments and

*Those words in italics, are inserted by the editor, as conveying the supposed meaning of the original document, there being an hiatus of one line in the Journal of the House of Representatives, from which the present edition is copied.—EDITOR.

wishes, in order to unite cordially in accomplishing an object which they deem essential to the honor and prosperity of the state; and we have the satisfaction of saying, that there has been a concurrence of opinion in the direction of all our principal operations.

In reference to the plan, for the location of a canal, then proposed, it was deemed important to determine from actual view the most proper point of its northern termination, taking into consideration the expence of constructing the canal, the convenience and safety of the harbor, and the health and other advantages of the site for a commercial town. The result of these views it will be unnecessary to detail, as subsequent examinations have rendered it, at least extremely doubtful whether a canal on the Sandusky and Scioto route can ever be made. Immediately after the meeting of the board at Lower Sandusky, in July last, the acting commissioners proceeded to the Tymochtee summit accompanied by Mr Skiff, and there commenced the location of a canal line from that summit northwardly towards Lower Sandusky, agreeably to a resolution of the board.

Col. Bourne, a gentleman in whose talents the commissioners felt the highest confidence, was also at that time in our employ. Mr Forrer was still engaged in carrying the level from the Loramies to the Tymochtee summit. With the aid of these gentlemen it was proposed to continue the location of the line northwardly from the summit, and at the same time proceed in the location of a line southwardly from the same summit to the Ohio river.

Our general plan of operations, was very much deranged by the extreme unhealthiness of the season. Few of the men employed to make up the necessary parties, were able to preserve their health or continue their services more than one week at a time. Mr Skiff continued his labors only fourteen days, when his ill health compelled him to leave our service. He was removed to Worthington where he was enabled to procure the attendance and advice of skilful physicians. They were, however, unable to remove his disorder; and he fell a victim to an obstinate complaint, under which he had probably labored for some time before he left his native state. It is with sincere regret that we are called upon to notice the death of an amiable and intelligent young man, who had commenced a career of usefulness in which he gave promise of being eminent.

Soon after Mr Skiff had left the work, Col. Bourne was attacked with a fever, which compelled him also to leave our service. His ill health continued so long as to prevent his engaging in the engineer's department, during the remainder of the season. Mr Forrer also suffered so much from exposure and the sickness of the season, as to deprive us for some time of his services.

Under these circumstances our progress in locating a canal, was necessarily very slow; a line was however, located from the Tymochtee summit, northwardly, about eight miles, and a random line was run, which, with little variation, would make an excellent line of canal from thence to the Tymochtee creek near its mouth, and also from Fort Ball, to the mouth of Wolf creek. A line was also located by Mr Bourne from the Tymochtee summit southwardly about seven miles, previously to his being compelled, by sickness, to quit the service.

The valley of the Scioto, north of Columbus, and of the Sandusky south of Fort Ball, were also explored by the acting commissioners, and Mr Samuel Forrer. The valley of the Scioto, from the mouth of the Little Scioto, southwardly, as far as a point nearly west from Delaware, is remarkably favorable for canalling; from thence southwardly to M'Coy's mill, it presents serious difficulties; this part of the valley is narrow, the hills steep and composed chiefly of limestone, very much broken with seams and fissures, and near the surface of the earth, lying in loose fragments.

The valley of the Sandusky, from the mouth of the Tymochtee, to a point about three miles above Fort Ball, presents obstructions to canaling of a serious nature. The valley is narrow and the river extremely serpentine, passing frequently from one side of the bottom to the other, and running at the foot of the high lands on either side of the river it forms high wash banks, nearly perpendicular, rising from 60 to 120 feet above the level of the water.

The aggregate length of these wash banks on the west side of the river between the mouth of the Tymochtee and Fort Ball, is about four miles; and the wash banks on the east side are supposed to be of equal length; the river rises here in high floods about 16 feet above low water mark.

Considerable time was spent in endeavoring to find some practicable route for a canal between the Tyamochte creek and Fort Ball without entering the immediate valley of the Sandusky river, but without success. From the high wash banks which rise abruptly from the margin of the river, the high land extends eastwardly to the waters of the Blanchard's Fork of the Auglaize river, offering no valley, or depression through which it is possible to pass a canal without encountering an extent of deep cutting which would be extremely expensive. And the country south of Tymochtee is too low to admit of pursuing a level sufficiently high to pass over the high lands north of that creek. Besides, this long level, were it possible to pursue it, must be supplied with water solely from the summit pound.

During the month of August the streams, which had been relied upon to supply water for feeders to the Tymochtee summit, had diminished so rapidly and the quantity of water passing in them was, in the latter part of that month, so small, although an uncommon supply had fallen in the early part of the summer, that an apprehension was entertained as to the sufficiency of water for that summit. This induced the acting commissioners to determine on gauging the streams.

It was found impossible to keep an engineer's party together in a situation for active service, on account of the sickness of the season. But one of our engineers, Mr Forrer, was at that time able to attend to business. The work of locating, would not therefore be retarded, by taking him from that employment. Accordingly, one of the acting commissioners, Mr Kelley, together with Mr Forrer, proceeded to gauge the Sandusky river at Upper Sandusky, ten miles below the point from which its waters could be taken by a feeder into the summit pound of the canal. Between these points there is a considerable accession of water from a number of springs. The river here was found to pass through two 18 inch guages, rising in each to the depth of 6 inches and discharging by computation 220 cubic feet of water per minute—judging from undoubted information, not more than one third part of that quantity passed at the place in the dry season of 1822.

The Scioto, at the place where the Urbana road crosses that river, discharged only 26 cubic feet of water per minute, passing over a gravelly bed without pressure, fourteen inches wide and three inches deep. This place is about twelve miles above the mouth of Rush creek, the point from which it is proposed to take the water, in a feeder, to the Tymochtee summit. People living on the bank of the Scioto, south of the Greenville Treaty line, and below the mouth of Rush creek and Little Scioto, state that in the driest part of the season of 1822, the water in the Scioto, only stood in ponds in the deep places in the bed of the stream; but that no water passed over the ripples or gravelly bed of the river, between those ponds. From undoubted information; this was also the situation of the river at the Urbana road. It was therefore thought unnecessary to gauge that river at any place between the Urbana road and the Greenville Treaty line. The waters in the main branch of the Great Miami, of Cherokeean's run and of Buckingelas, were also gauged at points from whence they can be severally taken, and by an artifi-

cial cut turned into the Scioto at Roundhead's town. The water in the main branch of the Great Miami was found to pass through an 18 inch guage at the depth of $4\frac{1}{4}$ inches, discharging 63 cubic feet per minute. The Cherokeean's run passed through a 3 feet guage, at the depth of $5\frac{1}{4}$ inches and discharged 190 cubic feet of water per minute. The Buckingelas passed through a $4\frac{1}{2}$ feet guage at the depth of $7\frac{3}{4}$ inches and passed 470 cubic feet per minute. Stony creek, half a mile from its mouth, passed, by estimation, 650 cubic feet of water per minute. Only one branch of this stream can be conducted into the Scioto at Roundhead's town, and in that way carried to the Tymochtee summit. The quantity of water which could be obtained from this branch may be estimated at from 300 to 350 feet. Supposing the quantity of water taken from Stony creek to be 350 cubic feet per minute, and that taken from Sandusky to be equal to what passed at Upper Sandusky in August 1823; the aggregate amount thus obtained, would be 1319 cubic feet per minute, estimating the water at the several points from which it is taken—(Note 1.) To conduct this water to the Tymochtee summit, it would be necessary to make an artificial cut from the north branch of Stony creek, passing Buckingelas, Cherokee run, the main branch of the Great Miami, and collecting the waters of these streams as it proceeded, and thence to the Scioto near Roundhead's town. The length of this cut would be about 25 miles. The water would then pass down the Scioto, most of the way in its channel, a distance of from 35 to 40 miles including its turnings, to the mouth of Rush creek. A dam of 6 feet in height and an artificial cut of about seven miles, would then convey the water to the summit. The whole length of this feeder would be about 70 miles, at least 32 of which must be artificial. To convey the waters of the Sandusky, to the summit pound, an artificial cut of about 10 miles in length, would be necessary. Thus an aggregate of 80 miles of feeder, more than half of which must necessarily be artificial, would be required to conduct these waters to the summit pound. How much of this water would be expended in thus conducting it to the summit, cannot be accurately estimated, it must, however, be considerable.

The Scioto, in a very dry season, above the mouth of Rush creek, exhausts by evaporation and absorption, nearly all the waters which it receives; and should the surface of the water be extended over a greater portion of its gravelly bed, by throwing an additional quantity into its channel, the loss by evaporation would necessarily be greater. It would certainly be unsafe to calculate on delivering, by these feeders, into the summit pound, more than one thousand cubic feet of water per minute; and even this estimate, will probably be found too large, if tested by experiment. With this water it would be necessary to supply a line of canal from the mouth of Tymochtee creek on the north, to a point on the Scioto nearly west of Delaware on the south, a distance of fifty miles. And should the Tymochtee level be preserved so as to throw the canal into the Whetstone valley above Worthington, the length of line would be extended twelve miles further. Whether so long a line of canal can be supplied by this quantity of water it is important to determine.

No physical obstruction to make a canal, which may not be overcome by the application of sufficient labor can exist, provided the requisite quantity of water can be obtained on the highest levels, over which the canal must necessarily pass. But a supply of water on the highest, as well as in the inferior levels, being an indispensable pre-requisite to the construction of a canal, it becomes important to determine the quantity of water required to supply a canal on any proposed route, and to ascertain whether that quantity can be procured. To do this satisfactorily, it is necessary to investigate the subject of the expenditure of water in canals, and to test the deductions drawn from theory by practical results as far as they can be had.

The amount of water required to supply a given line of canal, depends on a variety of circumstances. The water is exhausted or expended by locks, by leakage or filtration, by evaporation and absorption. The amount of water expended in passing boats through locks, can be easily estimated. It depends on the capacity of the locks and the number of boats which are passed through them. Thus a lock of 90 feet in length, of 15 feet in breadth, and of 8 feet lift, requires to fill it 10,800 cubic feet of water; or in passing a boat through it, that quantity of water is expended; or, descends from a higher to a lower level, in the canal. A boat, in passing over or through the summit level of a canal, from an inferior level on one side, to an inferior level on the other, requires the expenditure of a lock full, to raise the boat from the lower level into the summit pound, and the like expenditure, to pass the boat from the summit pound into a lower level on the other side. Thus a boat passing the summit, by means of locks of the above dimensions, expends, or draws from the summit pound 2 600 cubic feet of water. If one hundred boats pass per day, it will require the expenditure of 2,160,000 cubic feet, equal to an average of 1500 cubic feet per minute. Should the same number pass in an opposite direction during the same period, the boats passing alternately each way through the same lock, no greater expenditure of water would be required. The lock being filled in raising a boat from a lower level into the summit pound, would be ready to receive the boat prepared to pass down through the same lock as soon as the ascending boat had left it—and when the water had been drawn out to pass the descending boat into the lower level, the lock would be prepared to receive an ascending boat. Thus one boat ascends and another descends, by filling and emptying the lock but once. But this method of passing boats, is not always convenient, as a greater number may be proceeding in one direction than in the other; and it would be extremely vexatious to compel a boat to wait at a lock until one should arrive to pass in the opposite direction.

The dimensions of the locks should be such, as to admit boats of the proper size for navigating the canal to advantage. It is a general rule, that the burthen or tonnage of a vessel should bear some proportion to the length of the voyage she is destined to perform, in order to make that voyage profitable. A canal of the length necessary to pass from the Lake to the Ohio, through the central parts of the state, would require locks of the length and breadth above stated, in order to make its navigation most advantageous to the public. The lift of the locks must in a great measure depend on the topographical situation of the country through which the canal line is located. Locks of small lift are more expensive in their construction and the attendance which they require, and occasion greater delay in passing boats than those of greater lift, in proportion to the difference of the levels they overcome. They are, however, less subject to accident, and expend less water. Locks of from eight to ten feet lift are generally believed to combine the most advantages.

Every canal which is so located, as to be the most convenient channel of commerce, from an extensive region of country, abounding in population and wealth, should be calculated to bear on its bosom, as many boats as time will permit to pass through the locks. No delay should be experienced for want of a sufficient supply of water, if it is possible to avoid it. If the supply of water will admit of but half the business that might otherwise be done, the profits of the canal are but half as great, and the public derives comparatively less advantage.

Besides the damage sustained in consequence of unexpected delays in the transportation of property, by individuals who have purchased large quantities for market, is often ruinous to themselves and distressing to the public. It is important that any channel of commerce, or method of transporting property, should be certain as well as cheap and convenient.

Two hundred boats may pass through the same lock in twenty-four hours; and supposing them to pass in the manner which would require the least expenditure of water, through locks of the dimensions and lift above stated, the quantity requisite to supply the summit pound, of a canal with lockage water alone, would be equal to 1500 cubic feet per minute.

Different plans have been devised to prevent an expenditure of water by passing boats from one level to another by means of moveable locks and inclined planes. From the examination we have been able to give the subject, they seem to be well calculated to overcome great differences of levels in contiguous sections of a canal.

They may perhaps be used to advantage in all cases where it is necessary to construct canals in situations where the requisite supply of water to pass boats through locks of the ordinary description cannot be had.

The loss of water from evaporation cannot be so accurately estimated. It varies in different countries, climates and seasons, and depends on the exposure to the wind, the temperature of the water, the relative temperature of the incumbent atmosphere, and a variety of other circumstances. It must, however, be observed that the greatest evaporation usually takes place during summer and the early parts of autumn, when the quantity of rain which falls is commonly least, and the streams lowest.

The loss of water from evaporation in the New York canals, though its amount has not been precisely ascertained, is supposed to be much greater than was anticipated before their construction.

The expenditure of water from leakage, filtration and absorption, it is still more difficult to estimate, so much does it depend on the nature of the earth through which a canal is made, and its manner of construction that a knowledge of these circumstances is absolutely necessary to form an opinion with even tolerable accuracy, as to the amount of loss from these means. Some kinds of earth are so loose and porous as to be almost incapable of holding water. This difficulty may, however, be obviated by puddling or lining with earth of a more impervious quality. Canals constructed on sidelying ground, and along the face of steep hills are much more subject to leak than those conducted through level ground or along the bottom of a valley. Where a canal is made along the face of a hill, water which enters the lower bank readily passes off to a still lower level, and its place is immediately supplied with water from the canal. This process continually going on even though the earth is not remarkably porous, exhausts a large quantity of water.

A line of canal conducted along the bottom of a valley or on the lowest ground in its vicinity, expends but little water by leakage. The banks though porous being once saturated with water which finds no lower level to which it can escape, permit no water to pass off. The only loss of water in this case is from absorption and evaporation. In all cases where the banks of a canal are composed of earth, considerable loss of water must necessarily be sustained in dry and warm seasons from absorption.

The earth which comes in contact with the water, will become saturated, and will communicate its moisture to the earth that comes in contact with it, and so on until the earth, to a considerable distance from the canal, becomes partially at least, saturated with water. The surface of the earth which is exposed to the action of the sun and wind, if not abundantly supplied with water, becomes dry and thirsty, and absorbs with avidity the moisture from the wet earth, or water, with which it comes in contact. The loss of water by this process must necessarily be greater where the water in the canal is raised above a level with the natural surface of the earth in the immediate vicinity; because water more readily descends or passes in a horizontal direction through the earth, than it ascends through the same medium.

The loss of water from leakage, or filtration through the banks, generally continues to diminish for some years after the construction of a canal. The banks gradually become more compact and solid; the sediment and small particles of earth are deposited by the water in the interstices of the larger substances, by which means the whole mass becomes more impervious to water. How long this operation will continue to go on, is uncertain, and depends on circumstances: five or six years probably, in ordinary cases, is a sufficient length of time to complete nearly all that may be expected from this process. The loss of water by leakage at locks is not very considerable.

The only satisfactory information relative to the loss of water from evaporation, filtration and absorption, must be drawn from experience. The deductions from this source of information, which relate to practical operations can be relied upon with more safety and confidence than those drawn from any other source, and should never be disregarded. Considerable exertions have been made by the acting commissioners, to ascertain the quantity of water expended on different sections of the New York canals, which are the great school of the United States in the science of canalling. The result of those inquiries is given.

About sixty-one miles of canal line, from Rochester to Seneca river, is supplied with water by a feeder taken from the Genessee river and two other small feeders between Genessee and Seneca rivers. About six thousand cubic feet of water per minute were required to supply this section of the canal. Five hundred cubic feet of water per minute were probably required at this time for passing boats through the locks which expenditure would admit the passage of fifty boats per day—leaving 5,500 cubic feet of water per minute to be expended by evaporation, leakage and absorption; which would be equal to an average expenditure of 90 feet of water per minute on each mile of canal. This section of the Erie canal is located on ground favorable to the retention of water, and is considered as a fair specimen of canal line, from which to draw deductions on this subject. Some large embankments occur, but they are so compact and well constructed as not to occasion the loss of much water. A small proportion of the distance is located on side-lying ground, but a much greater proportion is constructed on level ground and through swamps and marshes. The earth is in most places well adapted to the retention of water, though in some places porous earth is found. Most of this line has been in use nearly two years, and part of it more. Lockage water is only required in one direction, on this section of the canal.

The Cammillus level or summit is about 11 miles in length, and has a lock at each end of 12 feet lift; it has been filled and used four years. The ground through which it is located is generally level; no large embankments occur, and the earth is generally well calculated to retain water.

This level required last November an average supply of 2000 cubic feet of water per minute. Supposing the locks at each end of this summit to be filled and emptied 40 times in the course of 24 hours, which would admit the passage of 60 boats across the summit per day, allowing one boat to pass up and one down alternately, in half the instances requiring the locks to be filled; which would perhaps be a fair estimate. The quantity of water drawn from the summit for lockage, would be 900 cubic feet per minute. This estimate would leave 1100 cubic feet per minute to be expended by leakage, evaporation and absorption, equal to 100 cubic feet per minute on each mile. On this summit there is, in dry seasons, a scarcity of water.

The Rome summit level is 69½ miles in length, and most of it has been filled with water and in use five years. The quantity of water expended on this level in November last, would average about 9000 cubic feet per minute. Admitting that the same quantity is required for lockage water as on the Cammillus summit, though the locks at each end of this level have not so

great lift, there would remain 8100 cubic feet per minute to be exhausted by leakage, evaporation and absorption, equal to an average of 116 feet per minute for each mile. This line of canal is generally located on level ground, and the earth is mostly of a quality as well calculated to prevent the escape of water as could be reasonable expected, on any line of the same extent.

It has been ascertained that about 5000 cubic feet of water is passed into the canal through the aqueduct at the Little Falls on the Mohawk river. This water supplies the canal for 12 miles eastwardly, where an additional feeder from the Mohawk was found necessary. No part of this water is required for lockage as this section of the canal receives from the locks above as much water as is required to feed those below. This part of the canal is conducted for a considerable distance along the margin of the Mohawk, in artificial walls and embankments which are very leaky; and is not considered as offering a fair example from which to judge of the expenditure of water in ordinary cases.

From the foregoing it will appear that the expenditure of water by evaporation, leakage and absorption, is 14,700 cubic feet per minute on those sections of the Erie canal, from the Genessee river to the Cayuga marshes—the Cammillus level, and the Rome level, making an aggregate length of $141\frac{1}{2}$ miles, which is equal to an average expenditure, besides lockage water, of something over 100 cubic feet on each mile of canal per minute.

It may, however, fairly be presumed that the banks, at least on a considerable part of this line, will become considerably more compact and more impervious to water. If therefore, we suppose that where a canal is constructed on favorable ground, well calculated to prevent the escape of water after a use of some years, that an average of 75 cubic feet per minute, for each mile, will be sufficient to supply the loss occasioned by evaporation, leakage, filtration and absorption, we shall probably not be far from the truth.

To apply the above deductions to the case under consideration: If we assume 50 miles as the length of canal line which would require to be supplied with water, introduced at the Tymochtee summit, and allow 75 cubic feet per minute for each mile, to supply the loss occasioned by evaporation, leakage and absorption, we shall find that it will be necessary to introduce into that summit level 3750 cubic feet of water per minute besides the water required to supply the locks. But supposing moveable locks or inclined planes to be substituted in the place of fixed locks, so that little or no water shall be required to pass boats from one level to another, and admitting that the expenditure of water from leakage, evaporation, &c. will only be half as great as on the same distance of the New York canal, owing to the great tenacity of the earth, and a greater proportion of it being constructed on level ground, still 2500 cubic feet of water per minute, would be required; and we have seen that from the sources here relied on to supply feeders to that summit only 1000 cubic feet per minute could be delivered into that summit pound; still leaving a deficiency of 1500 cubic feet per minute.

Another method has been suggested for supplying with water the Tymochtee summit, to which we have before adverted. It has been proposed to construct a feeder from Mad river at a point near Urbana, crossing the Loramies summit, and from thence pursuing the level by passing to the north of the head waters of the Scioto, crossing the extreme southwardly branches of the Auglaize, Hog creek, Blanchard's fork and Tymochtee, to the summit. This feeder would be about 150 miles in length, a very considerable part of its course between Mad river and the Loramies summit, must necessarily be located on sidelaying ground. The quantity of water which might be introduced into this feeder from Mad river would be about 6000 cubic feet per minute. This river was found by estimation to yield immediately below the

mouth of King's creek, that quantity on the first of September last. Probably 1000 cubic feet per minute might be introduced into this feeder, between the point where it would leave Mad river and that of its crossing the Miami an additional supply of about 2100 cubic feet per minute might be introduced from the Great Miami into this feeder by an artificial cut of about 15 miles in length. This quantity of water was found to pass in the Great Miami, at a point sufficiently elevated to be thrown into the Mad river feeder. The aggregate length of the feeders, required to conduct these waters to the Tymochtee summit by this route would probably be 160 miles. One hundred miles of this line would be in a country which, at present, is totally uninhabited except by the natives.

The expence of constructing so long a line of feeder must necessarily be great, especially if attempted whilst much of the country through which it must pass is a wilderness. To counterbalance this expence it has been proposed to make this line of feeder navigable, so that it may answer the double purpose of supplying the Sandusky and Scioto line with water, and at the same time serve to convey the productions of the Miami country into the main trunk of the canal, and from thence to the Lake.

Was the state prepared to encounter this expence; and was there a certainty of being able to supply this long line of navigable feeder with water, and through the same channel, to supply the Sandusky and Scioto summit, the project would undoubtedly be one, deserving of attention, and its advantages would warrant its accomplishment. It will, however, be observed, that should this work be undertaken, very little profit could be derived from its construction until the whole length of the feeder should be completed. That part of the main line which depended on this feeder for its supply, could not be used until the feeder was constructed. The navigation on so long a line of canal, depending for its supply on the water which must be introduced at one end, would necessarily be obstructed, should a breach occur in any part of its course.

The possibility of supplying this long line of navigable feeder, and through it 50 miles of the main trunk of the canal with water, is a question of more serious import than its expence. It is assumed that 9,000 cubic feet of water per minute might be introduced into this feeder. This includes all the head waters of the Great Miami which were, by another plan proposed to be introduced into the Scioto at Roundhead's town. Admitting that 220 feet per minute from Sandusky, and 75 feet from the Great and Little Scioto, may also be introduced into the summit pound by a feeder ten miles in length from the former stream, and a dam across the main Scioto, below the mouth of Little Scioto, or by a dam at the mouth of Rush creek, with a feeder seven miles in length, and one across Little Scioto, where the canal would pass, the whole amount thus introduced will be 9,396 cubic feet per minute.—With this water, it would be necessary to supply 180 miles of canal and navigable feeder, and including the feeders from the Miami and Sandusky rivers 45 miles of feeder not navigable, in addition, which altogether may be assumed equal to 200 miles of navigable canal. It has been ascertained from experiments stated above, that $141\frac{1}{2}$ miles of the Erie canal in New York, expends 14,700 cubic feet of water per minute, not estimating lockage water, and that for supplying 200 miles on the foregoing plan in this state, only 9,396 feet per minute, can be obtained. Every deduction, therefore, which can be drawn from facts tested by experience in New York, seems to decide against the probability of our being able to supply the upper levels on Sandusky and Scioto route with water from the Mad and Miami rivers. On this subject we have obtained the opinion of an able and experienced engineer, which is herewith communicated, (Note 2.)

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY, BY JOHN KILBOURN, AT \$3 A YEAR, IN ADVANCE.

VOL. I. COLUMBUS, OHIO, SATURDAY, JULY 19, 1828. NO. 5.

Readers will notice that the Canal Documents are continued on the third page of every number, from the last page of the preceding number.

From the Middletown [Conn.] Gazette.

There are in this city, and within a mile of its limits, eleven manufactories, giving employment to nearly 400 persons.

The Arrowmagnet Manufacturing Company was incorporated at the late session of the Legislature, with a capital of 150,000 dollars, and has just commenced operation. The building is filling up with machinery: 2000 spindles are eventually to be run. This manufactory, as also the five which we shall next mention, is situated on a branch of the Little River (which empties into the Connecticut between this and the Upper Houses,) some 80 rods from its confluence with that river. The principal articles of manufacture at present, are cotton and webbing.

As we ascend the stream, the next is William S. Nichols's Comb Factory. This has been under way for several years, and now employs 30 persons, who throw off something upwards of \$100 worth of work per day.—Combs of every description are made here.

Next is Mr Starr's Manufactory, formerly so celebrated for turning out swords. The swords made here are every way equal to the far famed blades of Damascus. Since this was erected, the policy of our government has changed from a warlike to a pacific nature, and the demand for those "death-doing" blades has materially diminished. The proprietor is principally engaged in the manufacture of muskets and rifles for the general government.

Col. North's Pistol Manufactory is a short distance from Mr Starr's. The Pistols made at this establishment have obtained a reputation equal to the swords of Mr Starr.

Next are Coles's Paper Mill, and Rand's Powder Mill—both pretty extensive establishments. Still higher up the stream, yet within the town, are four unoccupied mill seats—equal we venture to say, to any in New-England.

Three manufactories of machinery, one belonging to the Sanseer Company, the proprietors of the Brewster wool spinner, form a machine on which one girl spins two hundred runs of fine yarn per day, or 320,000 yards; and performing for one cent per pound what at the commencement of the woollen manufactory in this country cost thirty cents. The Sanseer Company are also the proprietors of, and build the Brewster short live spindle and cotton rope. The above machines have been furnished by the company to the Prussian government, England and France, and are highly approved of in those countries. Messrs

Russell and Smith, and Mr Richardson, have also extensive machine shops.

The rule and gunter scale manufactory, owned by Messrs Russell, in which vast quantities of the article are made entirely by machinery, the invention of Mr Hedges, a very ingenious mechanic, furnishes a desideratum to our carpenters, and bids fair by the accuracy of the work to drive from the market the imperfect productions of our foreign rivals.

The Pameacha Manufactory, deriving its name from the stream on which it is situated, employs from 150 to 200 persons, consumes 100,000 lbs. of fine wool, and turns out 50,000 yards of finished broad cloth a year.

The Messrs Burrows are extensively engaged in the manufactory of cards, for which they are constantly receiving orders from the western and southern factories.

P. S. We were near forgetting Johnson's Rifle Factory, which is located on the Pameacha river, a few rods below the Pameacha Manufactory. Vast quantities of first-rate Rifles were formerly made here. At present, few hands, comparatively, are employed.

Notes on the Internal Improvements of Pennsylvania.

In Pennsylvania party spirit has not been connected with internal improvements, hence her march, although rapid and constant, has been silent and unostentatious. If we except three of the almost uninhabited counties which are in the north western part of this state, five-sixths of every part of the commonwealth will be intersected by canals and rail ways, leaving *no point* at a greater distance from the highways than 23 miles, when the works now *in progress* shall be finished.

We shall prove chiefly from official documents that from the year 1791, to July 1, 1828, the enormous sum of \$22,010,554 68 cts. has been expended by the State and by Corporations: on canals, rivers, turnpike-roads, rail ways and bridges; *exclusive* of the sums expended by the *counties* on roads, bridges, &c. and *exclusive* of the sums expended by the state prior to 1791.

We shall also show that additional works are in actual and rapid progress; that they will be finished in three years from the present, at an additional expense, estimated at \$12,450,000, (exclusive of works authorized, and, for constructing which, companies have been formed, but have not determined the period when their works shall be completed,) making a grand total of 34,460,554 dollars and sixty-eight cents, expended in Pennsylvania in forty years,—from 1791 to 1831 for internal improvements. It may reasonably be concluded that, within the three years

which we have mentioned, many other works will be projected, commenced, and partially or completely executed.

From the year 1791 to 1823, 265 companies have been incorporated by the legislature for the purpose of effecting various internal improvements. 1st Rail road, canal and navigation companies, 36: of which 14 have commenced operations; of the 22 remaining it is probable that 8 or 9 will commence their works.

To this list may be added the canals and rail-ways now being executed by the state.

Total extent of rail ways, canals and slack water navigation authorized by law, 2,021 2-3ds miles, exclusive of works abandoned. Some of the companies are authorized to make either part or the whole of the works in the form of canals, rail ways, or slack water navigation, as they may deem most expedient. In the following list we mention the mode adopted, or intended to be adopted by them.

Canals	1233	miles authorized.
Slack water	220	_____
Rail-ways,	567 5-12	_____

Of the above 2021 2-3 miles, 426 have been completed, or will be completed in the course of next month, at an expense of \$11,019,495 18cts.

Canals,	301	miles completed.
Slack water,	117	_____
Rail-ways,	17	_____

In progress, and to be finished in three years from the present: 905 miles; including the state rail-ways and canals, although parts of these works are not yet actually commenced.

Canals,	746	1/2
Slack water,	10	
Rail-ways,	149	

Of the remaining 679 1-6 miles, it is highly probable that the greater portion will be commenced and finished within a few years; but as no certain time has been appointed for this purpose; as some of the projected works may be abandoned; or other modes, or routes, be adopted; we do not deem it expedient to describe them at present. Several of the companies above mentioned, were authorized by the legislature to construct works of greater extent than we have indicated; but as no serious intention of availing themselves of the privilege ever was entertained, we have omitted the surplus.

The amount of lockage on the works completed and in progress, 4618 feet; exclusive of the lockage on the Lackawaxen canal (part of the Hudson and Delaware canal company's works) and exclusive of the lockage on the works authorized: but either not commenced, or if commenced, the period of their completion hereafter, unknown. Ascent and descent overcome by railways, 4637 feet and upwards; (the exact amount of which is unknown) to this must be added the ascent and descent on the rail-way of the canal company just mentioned; and of a few minor rail roads leading to iron-works, &c.

It is to be regretted that more uniformity, or at least correspondence, or proportion, in the size of the locks on the various canals has not been required by law.—Penn. Gaz.

SUMMER TRAVELLING.

The facilities for travelling, during the summer season, are now such as to induce thousands annually to visit the Northern States, on business, or amusement. Some of the greatest objects of curiosity and wonder, are in the state of New York. To this region the greatest mass of summer travelling from the south, and from the great Mississippi valley tends.—And to furnish those who have not visited these scenes, with some account of them we subjoin the following desultory notices.

From Cincinnati, the great point of landing for steam-boat passengers, from the lower Ohio and Mississippi, there are two or three variant routes across the state of Ohio.—The most direct, is a stage route from Cincinnati, via Reading, Lebanon, Waynesville, Xenia, Yellow-Springs, Springfield, Urbana, Upper Sandusky, Oakley, and Lower Sandusky, to Sandusky city, 213 miles. By leaving this route at Springfield, and going eastwardly to Columbus the state capital, and from thence northwardly through Sunbury, Mt. Vernon, Mansfield, Newhaven, Norwalk, and Milan, you arrive at Sandusky city aforesaid, in a distance of 245 miles.—By branching off from the last mentioned route, at Mt. Vernon, and passing through Loudonville, Wooster, and Medina, you arrive at Cleveland, on the southern shore of Lake Erie, 60 miles east from the port of Sandusky, and at the commencement of the Ohio grand Canal. Distance from Cincinnati, 255 miles.—Or, you may take a canal boat at Cincinnati, and sail up the Miami canal past the towns of Hamilton, Middletown,* Franklin, Miamiesburg, and Alexandersville to Dayton, 67 miles, then take a stage to Springfield, 25 miles,—and from thence, any one of the three routes beforementioned.

From Sandusky city, the principal place of embarkation, on Lake Erie, you take a steam boat, and sail along near the United States side of the lake, at from three to ten miles distance from the shore, past Huron, and Rocky rivers, Cleveland, Chagrine, Grand River, Ashtabula, Erie, in Pennsylvania; Portland and Dunkirk in N. Y. to Buffalo, 250 miles.

From Buffalo there are two principal routes of travelling to Albany, and to the Saratoga Springs. One is a stage route of about 300 miles, and the other, by the New York grand Canal, a few miles north, but generally parallel with the other. Distance 363 miles.

Many travellers, who have both money and leisure, travel sometimes on the canal: and sometimes by the stages, to view the beautiful towns of Canandaigua, Geneva, &c. and "sweet Auburn loveliest village of the plain," together with a vast many more rural villages, exciting a continued interest, as the traveller is rapidly whirled through them, in stages, going 100 miles a day.

* The Miami canal is not now actually navigable, beyond Middletown, 43 miles; but it is expected to be completed to Dayton, within about 60 days; or by the middle of Septemba

Believing that the upper levels, on the Sandusky and Scioto route could not be supplied with the necessary quantity of water in dry seasons, by either of the methods above proposed and considered; the acting commissioners called a meeting of the board for the purpose of determining the course of operations during the remainder of the season. The board, after deliberating on the subject, from the facts and views laid before them by the acting commissioners, came to the conclusion that a further expenditure of time or money, in locating a canal line on the Sandusky and Scioto route, would be inexpedient, unless some other method of supplying the upper levels with water, should be devised, or some other source of supply discovered.

It was then determined that Mr Forrer should proceed to the Killbuck summit, and commence locating under the direction of the acting commissioners, a canal line along the vallies of that stream, the White Woman's creek, and the Muskingum, thence through the Licking and Walnut creek vallies to the Scioto; and if time would permit, from the Killbuck summit northwardly to the Lake. The board also directed that further examinations should be made in order to ascertain more satisfactorily whether it would be possible, from any other source than those heretofore proposed, to supply with water the Tymochtee summit.

Agreeably to this plan, Mr Forrer, with the requisite party proceeded to the Killbuck summit, and commenced the location of a line southwardly along the valley of that stream in order to ascertain the practicability and expence of constructing a canal on that route. The result of his examinations and surveys will be noticed.

The acting commissioners, in the mean time made some further examinations for the purpose of determining the value of several sources which had been suggested as offering a supply of water for the Tymochtee summit. The Whetstone above Norton was viewed and much information relative to the quantity of water which could be drawn from the two main branches of that river was obtained. These streams were not guaged as they were at that time somewhat increased by rains; but from the information obtained, it is supposed that each branch of this river will yield in dry seasons 200 cubic feet of water per minute, some distance above their junction. To conduct the waters of these two branches of Whetstone, into the summit pound will require an artificial feeder of from 20 to 25 miles in length, admitting that the waters can be taken from those streams on a level sufficiently high to pass the dividing ridge between the Whetstone and Scioto, near the town of Marion. But if the dividing ridge cannot be crossed in that place, which is doubtful, a much longer feeder will be required. Supposing that 400 cubic feet of water per minute could be taken into a feeder of this length, it is extremely uncertain, whether the whole would not be exhausted by leakage, absorption and evaporation, before it could reach the summit pound of the canal. It would at any rate be necessary to encounter a heavy expence in proportion to the quantity of water thus obtained.

The large marsh situated in the confines of Huron, Richland and Crawford counties was also examined. It had been ascertained by James Geddes, Esq. that its elevation was such as to permit its waters to be conducted to the Tymochtee summit. In order to form an opinion of the quantity of water which might be drawn from this source, it was thought advisable to ascertain the amount of durable water poured into it by streams or springs from the higher lands adjacent to the swamp, and also to notice the peculiar character of the marsh.

This swamp like most others, was found to be composed of decayed vegetable matter in a semi fluid state, being saturated with water, and resting on a bed of tenacious blue clay. About 1200 acres of this swamp in Crawford county, is an open cranberry marsh; and a much greater extent, situated in

Huron and Richland counties, is free from timber, and generally covered with marsh or prairie grass, which in many places, is cut for hay, and carried off with teams. That part of the marsh near New Haven, in Huron county, descends very perceptibly to the northeast and discharges its waters into Huron river. The cranberry marsh in Crawford county, appears to be nearly level, and may be penetrated with poles in various places from five to ten feet, and probably in some places, even to a greater depth. It seems to have been formed by the gradual accumulation of grass, leaves and other vegetable substances which have been deposited in a widely extended shallow basin, which nature had there formed. The water which falls from the clouds on this marsh, and that which is poured in, from the lands in its immediate vicinity, in wet seasons flow over its surface, and pass off by various channels into the Sandusky and Huron rivers. After the waters are drained off its surface, these channels with the exception of the marsh branch of Huron, discharge little or no water; very few constant streams flow into this marsh. The country about is generally level, and in many places, spurs of the swamp extend to a very considerable distance from the open marsh. On the west and north sides of this swamp the land from near its margin, declines towards the Lake and Sandusky river, discharging its waters in those directions. The Broken Sword, a branch of the Sandusky, passes along within about two miles of its southern margin for some distance, so as to drain most of the water from the country south of the marsh; it also receives two drains from the swamp. That section of Richland county which is situated near the marsh, seems to be the only part of the adjoining country which furnishes it with any stream of magnitude, and even these are generally small, and with one exception, furnish very little water in dry seasons. Honey creek and Clear run are the most important; Honey creek half a mile from where it discharges itself into the marsh, yielded in September last, about 40 cubic feet of water per minute, in very dry seasons, it is said to discharge much less. Clear run, at the same time, would yield about the same quantity, and is said to be very constant; its waters pass through the northeast corner of the marsh, and are discharged into Huron river. If reliance can be placed on information derived from people living on the borders of this marsh, few springs have been found near its margin. The country in its vicinity with the exception of that part of it which is drained by Clear run, is generally unfavorable to the production of constant streams or large springs.

To arrest the waters which flow into this swamp and conduct them to the Tymochtee summit, it would be necessary to make an artificial cut, along its southeasterly margin of 12 to 15 miles in length, by which the water would be discharged into the Broken Sword, down the channel of which it would pass, including the meanders of the creek, 15 miles further; it must then be taken by an artificial cut of about 5 miles into the channel of the Sandusky, immediately above a point from whence it is proposed to take the waters of that stream by a feeder to the same summit pound.

Cutting ditches through the various parts of the cranberry marsh has also been suggested as a mean of draining off its waters for the purpose of supplying a canal. Some water might be obtained in this manner; but experience has shewn that in dry seasons, little reliance can generally be placed on such sources of supply. The quantity of water obtained from this swamp, by either of the methods above proposed, would probably not exceed three or four hundred cubic feet per minute in dry seasons, and might fall far short of this estimate.

The remarks made on the subject of the proposed feeder from the Whetstone, apply with additional force to this: the attainment of the object would be extremely uncertain, and in any event would be attended with an expence altogether disproportionate to the magnitude of the object obtained. As this

marsh is one of great extent and has by many been proposed to offer abundant means for supplying a canal with water, we have given a more detailed statement of its character than we otherwise should have thought necessary.

In reference to the question of supplying with water the upper levels of a canal in this state, it may be necessary to consider the various methods which have been resorted to under different circumstances, to accomplish a similar object. Of these the most simple and obvious is, to draw the requisite quantity from constant streams of sufficient magnitude; an equable supply is thus obtained without diminishing the fountain from which it is drawn. When durable streams sufficiently large and of the proper elevation are found in the vicinity of the summit pound, and no high grounds, or deep vallies intervene, to render it necessary to make deep cuts, large embankments or expensive aqueducts to conduct the water to the summit; canals may be easily supplied with water. But whenever it becomes necessary to convey water through feeders of great length, the expence is necessarily much enhanced and the danger of failure much increased. The observations heretofore made on the expenditure of water in canals from leakage absorption and evaporation, will apply to feeders; the loss of water in each, being in proportion to their relative dimensions, if their manner of construction, and the character and situation of the ground through which they are made, be the same.

Streams of sufficient durability and magnitude cannot always be found in the vicinity of a canal, to supply the summit pound, and other levels on the route; more difficulty has been apprehended from this than from any other source in the construction of a canal across the state.

Nearly the same medium quantity of water is supposed to fall on the same area of the earth's surface in different places in the same climate, taking one year with another; yet the streams which flow in different sections, do not bear an exact proportion to the extent of country which they drain, either in relation to their durability or the aggregate quantity of water discharged by them in any given period of time. When the soil and the topographical situation of a country are such as not to permit the water to sink into the earth, nor to pass off readily, much of the water which falls is retained on the surface until it is exhausted by evaporation, and the streams are neither large nor constant in proportion to the area of country which they drain. If a district be hilly and present no obstruction to the escape of the water, and the soil sufficiently impervious to prevent it from entering the earth in large quantities, it passes readily off in rainy seasons by the channels of the streams which are swollen to a great extent; but the water which falls upon the earth being in this manner soon exhausted, the streams which are large in wet seasons, sink into trifling rivulets, when not supplied by rains. A porous, stony, gravelly or sandy soil, which drinks, with avidity, all the water that falls upon its surface, and suffers it to pass readily into the earth, where it is neither subject to be exhausted by evaporation, nor to flow rapidly into the channels of streams, is the best calculated to yield a constant and equable supply of water. The earth in this case, serves as a great reservoir, which equalizes the expenditure of the water that is received into its bosom. In such districts of country, we generally find streams which are neither subject to be swollen into torrents in wet seasons, nor sunk into small rivulets in dry. The country upon the heads of Mad river, Great Miami and the Tuscarawas is generally of this character.

Lakes and ponds, also serve to equalize the expenditure of water. The surface being widely extended, the water rises slowly in proportion to the quantity poured into the reservoir, and declines gradually from the same cause. Accordingly we find streams issuing from lakes and ponds, generally more constant and less subject to inundations, than those which have not their surfaces thus expanded.

Streams generally become less in dry, and subject to greater floods in wet seasons, in consequence of clearing and improving the country in which they have their rise, and through which they run. This remark is particularly applicable to such streams as draw their supply from level swampy countries, possessing tenacious and impervious soils. The fallen timber and other obstructions to the escape of water being removed, and the swamp being drained, the water which was before retained by those natural reservoirs, passes readily off during rainy seasons, and little is left to supply the streams during those periods when there is no rain. Streams which draw their supply from deep porous soils are less affected by the clearing of the country. In some instances they may even be improved by this change. In deep gravelly and sandy soils trees usually strike their roots to a great depth. These roots, especially in warm weather, operate as so many pumps which intercept part of the water in its passage downward and carry it into the tops of the trees where it is expended by a kind of perspiration which takes place from the surface of every leaf. This draft upon the water, which is continued in the soil, being destroyed by removing the timber, more water is suffered to pass into the bowels of the earth for the supply of springs. In these soils small springs which were subject to fail in dry seasons before the timber was removed, are afterwards frequently found to yield a constant supply of water in periods of the greatest drought.

Reservoirs are often resorted to for the purpose of supplying canals with water where no streams in their vicinity are sufficiently large and durable to permit a constant draft upon waters requisite to supply the demand.—Lakes and ponds may frequently be made valuable reservoirs. The water in this case is suffered to accumulate in those seasons which afford a superabundance, and is drawn off for use whenever it is required. Reservoirs situate near that part of the canal which is to be supplied with water by their means are the most valuable in proportion to their extent. Thus situated, their waters may be used when necessary without taking from the reservoir a greater quantity than is needed. But if situated far distant from the place where the water is required for use, and especially, on a higher level, a sufficient quantity must be suffered to pass constantly from the reservoir to supply the greatest demand, and when less than usual is required the surplus must be lost. Reservoirs from which a given quantity of water may be drawn, are more valuable in proportion to their depth; less water is lost by evaporation, both because the water is not so much heated, and because the surface exposed to evaporation is smaller.

Artificial reservoirs have sometimes been constructed for the purpose of supplying canals where the requisite quantity could not be obtained from any other source. Deep basins or ravines, which require a small extent of embankments or walls to confine the water, present the greatest facilities for the construction of artificial reservoirs. Basins have in some instances been formed by excavating the earth for the purpose of forming reservoirs. The expence of this method of supplying a canal of ordinary dimensions with water, would be enormous, and alone sufficient to prevent its execution, except in cases of absolute necessity, and where the profits of the work would warrant encountering the expence. Reservoirs may also be formed by raising embankments or walls on all or some of the sides of a level tract of ground, having some stream in its vicinity susceptible of being turned into the enclosure. A work of this kind must be attended with great expence, subject to many accidents from the breaking or undermining of the banks, and would probably endanger the health of the country in its vicinity, unless made very deep.

Mr Samuel Forrer, with the requisite party, has located a canal line from the Killbuck summit, down the valley of that stream to its mouth; thence

along the vallies of the White Woman's creek and the Muskingum to a point near the mouth of Tomaka creek, a distance of 7 miles. After proceeding thus far, he commenced at the Licking and Walnut creek summit, with a view of locating a line northeastwardly to intersect the line before described, near the mouth of Tomaka; which is designed as a continuation of the same route: important examinations at the latter summit were made, and a line extending northeastwardly from the summit twelve miles was located; when the inclemency of the season, and the necessity of leaving the work, in order to make the estimates, and report of his proceedings, induced him to leave the line.

The line located by Mr Forrer, from the Killbuck summit to the mouth of Tomaka, may be considered as one offering great facilities to the construction of a canal. No insurmountable, or even serious difficulties occur, in this section of the route. Crossing the White Woman's creek is perhaps the most formidable, but the bottom and one of the banks being of rock, the building of a dam or aqueduct, will be a work, attended with no great hazard or difficulty.

The line upon which the engineer has been engaged during the latter part of the season, may be termed the Muskingum and Scioto route, which will cross the state from the Lake to the Ohio river, passing through the upper part of the Muskingum, the Licking and the lower part of the Scioto vallies. The advantages proposed by this route, are, that it will offer a navigable communication from the Ohio to the Lake, affording also a cheap and safe outlet for the surplus productions, and mineral treasures of the richest and most populous parts of the vallies through which it will pass: That it will present a direct and easy communication between the Muskingum and Scioto countries; enabling them to exchange the numerous commodities in which each abounds, and which will be wanted in the other.

On this line there will necessarily be two summits; that between the head waters of the Muskingum and the Lake, and that between the south branch of Licking and Little Walnut creek. The first of these summits can be more readily, and as abundantly supplied with water, as any other, between the waters of the Ohio and the Lake, in this state.

Early in October last, when the streams in the vicinity of the portage, were supposed to be as low as at any time during the last season, the main branch of the Cuyahoga, in the township of Stow, was found to yield 4000 cubic feet per minute; the Little Cuyahoga, or Furnace branch, 700 cubic feet per minute; the Tuscarawas river, near Haine's mill dam, 1500 cubic feet per minute; Wolf creek 400 feet; making an aggregate of 6600 cubic feet per minute.

Supposing the Tuscarawas summit to be cut down at its highest point 15 feet, requiring a medium cut of about 12 feet deep for one and a half miles, there can be thrown into the summit pound from the streams above named, 7400 cubic feet of water per minute, for which the longest, and perhaps the only feeder required, would be about nine miles in length; in this case, the Tuscarawas can be taken where it will yield 2300 cubic feet per minute. Lakes or pounds in the immediate vicinity of the summit, may be commanded, forming natural reservoirs, possessing a superficial area of about 1200 acres, and from which streams of water in the dryest seasons, constantly issue. The summit pound on this plan would be on a level with the Tuscarawas river, which at this place, never rises more than 4 or 5 feet above low water mark, and would extend northwardly from the Tuscarawas, about three and a half miles, one mile of which, would be through a small lake, extending north and south partly across the summit, and from which a stream of about 50 cubic feet per minute is constantly discharged. On dropping into the valley of the Cuyahoga, an accession of water can, at all times be obtained, suff-

ficient to supply any loss which may occur in the lower levels. In proceeding southwardly, along the valley of the Tuscarawas, the requisite supply of water may at all times be had. The length of the summit pound, and the inferior levels, to be supplied from it with water cannot be more than 6 or 7 miles. The two rivers are, at this place, within less than six miles of each other. From the situation and nature of the ground, little water can be expended at this summit except for lockage, it would therefore be unnecessary, for many years at least, to resort to either branch of the Cuyahoga for water.

By means of the feeder proposed by James Geddes, Esq. in his report made to the board last year, the greatest part of the water, which can be obtained at the Tuscarawas summit, may be thrown into the Killbuck summit. It being necessary to preserve as high a level as possible, in order to pass through the swamp between the Chippeway and Killbuck creeks, with this line of feeder, without too much deep cutting; the water of the Tuscarawas can only be taken in at a point as high up that stream as Haines' mill dam, where it passed only 1500 cubic feet of water per minute. The small lakes on the Tuscarawas, and part of Wolf creek, must also in this case be lost. To aid in making up this deficiency, about 100 cubic feet of water per minute, from the Chippeway, 50 from Killbuck and 35 from Black river may be obtained. The whole amount which can be obtained to supply this summit may be stated thus: From the main branch of Cuyahoga 4000 cubic feet; Little Cuyahoga 700; Tuscarawas 1500 feet; Wolf creek 300 feet; Chippeway, Killbuck and Black rivers 185 feet; making in all 6685 cubic feet per minute. To conduct this water to the Killbuck summit, a feeder of near 50 miles will be required, about 39 of which must be an artificial cut, agreeably to the report of Mr Geddes. How much water would be expended in this feeder from evaporation, leakage and absorption, cannot be accurately estimated. The observations heretofore made on the subject are applicable to this feeder. A reservoir of some value may be formed from the Chippeway Lake, which probably contains an area of from 200 to 300 acres, and is situated on the stream of that name, above the place where it is crossed by the line of feeder. Its distance from the summit, will make the use of its waters inconvenient and subject to loss, and will of course detract from its value.

The Killbuck summit is in many respects similar to that of the Tuscarawas. The summit pound would extend through a marsh, from the Killbuck to the east branch of the Black river; both those latter streams, however, are subject to be very much diminished by drouth. Killbuck, 5 miles below the summit, in October last yielded only 85 cubic feet of water per minute. Very little accession of water is obtained in descending this valley until we arrive at a point about 6 miles above Wooster, 10 miles from the summit, after which an adequate supply may at all times be had. In descending from the Killbuck summit north, very little additional water is obtained, until we arrive within eight or ten miles of Lake Erie. Black river, near the summit, yielded only 35 cubic feet of water per minute, in October last.— It will be observed that the two summits, above described, are proposed as offering a choice of plans, which cannot both be adopted.

Three routes for locating a canal from the valley of the Muskingum, at Coshocton, to the lake, having been proposed. The first, is to ascend the White Woman and Killbuck vallies, crossing the Killbuck summit in Harrisville, thence descending the Black river valley, northwardly to the Lake. The second, to ascend by the same line to the Killbuck summit, thence pursuing the route of the feeder from the Cuyahoga and Tuscarawas, to the summit between those rivers, thence down the Cuyahoga to its mouth. The third, to ascend the valley of the Tuscarawas, crossing the summit near its head, and descending the Cuyahoga. The first plan would offer the shortest and least expensive route for the main canal; would require the smallest

amount of lockage; but would be the most difficult to supply with water. The second would be a longer route and require more lockage, crossing a higher summit; would probably be somewhat more expensive, but more easily supplied with water; the third would require about the same length of line, and amount of lockage as the second; would probably be still more expensive, but the most easily supplied with water at the summit. These plans, however, present a local question, having no bearing on the southern part of the Muskingum and Scioto route, and one which must be determined by further surveys and examinations.

More apprehensions has been entertained with respect to supplying with water the Licking summit, than upon any other subject connected with the Muskingum and Scioto route. With a view of deciding this question, the streams which are susceptible of being turned on to that summit, were measured and estimated in September last. Racoon branch of Licking, at a point from whence it could be taken to the summit, was found to yield 600 feet per minute. North Fork of Licking 720 feet. This stream was at that place diminished by the stopping of mill dams above, and should have been estimated at 1000 cubic feet. The two branches of Owl creek, above their junction, were found to yield 1200 feet each, united they produced 2400 cubic feet per minute; 200 feet may be calculated on from the South Fork of Licking and the small streams which run into it, and would cross the line of canal, making an aggregate of 4200 cubic feet per minute. In the driest seasons 3000 cubic feet may undoubtedly be relied on from these streams.

To conduct these waters into the summit pound a feeder of 2 or 3 miles from Owl creek to the North Fork of Licking will be required; the waters of Owl creek will then mingle with those of the North Branch of Licking, and together proceed to Waggoner's mill pond, from whence they will be taken, and by a feeder of 7 miles conducted into the summit pound. A feeder of about 4 miles in length, will be required to conduct the waters of Racoon branch into the same pound. The summit level, will probably be about 15 miles in length and soon after locking down at each end of the summit, the loss from leakage and evaporation in the inferior levels, may be supplied.

By cutting down this summit about 30 feet at its highest point, a pound of about three and a half miles in length, and varying in breadth, from 8 to 60 rods, may be used as a reservoir by raising an embankment across the low ground at its outlet. This reservoir which may be made to contain an area of from 3000 to 5000 acres, and may be brought in contact with the summit pound, will aid in the supply of lockage water in dry seasons. By cutting down the summit, the loss of water from leakage will be somewhat lessened, and the feeders shortened; and when it is considered, that one foot of lockage at each end of the summit level, will be saved by every foot of cutting down, the whole expence will not be so much enhanced, as would at first view appear. If this summit is cut down, so as to permit the pond to be used as a reservoir, it will probably be unnecessary for some years to resort to Owl creek for a feeder.

From this summit down the Walnut creek and Scioto vallies to the Ohio, no difficulties of a serious nature are apprehended, and no stream of great magnitude will be crossed. Salt creek is the largest. The hill a little below Chillicothe, on the opposite side of the river, is probably the most formidable obstruction on this part of the route. From the examinations which have taken place, the canal line from the Licking summit to the mouth of Tomaka is also believed to be very favorable.

As a part of the plan now under consideration, it is proposed to construct a navigable feeder from the Scioto at Columbus, crossing Big Belly by a dam, receiving its waters into the feeder and joining the canal where it would

strike the Scioto valley. This will give to the engineer a more complete command of the ground in the lower part of the Scioto valley, than he would obtain by dropping down to the level with the river, near the mouth of the Walnut, in order to take in a feeder.

The unhealthiness of the season, and other causes which have operated to retard the prosecution of the surveys and examinations, have prevented the location of a line of canal on the Western or Miami route. The quantity of water which is susceptible of being thrown into the Loramies summit, has, however, been ascertained with tolerable accuracy, and has been stated in that part of the report, relative to supplying the Tymochtee summit with water from the Mad and Miami rivers.

It may, however, be proper here to state that all the water susceptible of being conducted to the Tymochtee summit by the proposed feeders from Mad and Miami rivers, can be thrown on to the Loramies summit.

In constructing a canal on this route, it has been proposed to continue the summit level along the vallies of the Loramies creek and Miami river, to a point nearly east from Troy, where it would receive the Mad river feeder. The whole length of canal line to be supplied by the waters taken from Mad river and the Great Miami, including feeders, may be estimated at 70 miles, about half of which would be navigable canal. It will be seen by referring to our former statements that about 9000 cubic feet per minute can be relied on for this object, which from the best estimates we can make will be amply sufficient.

In proceeding northwardly from the Loramies summit, it is proposed to pass into the valley of the Auglaize river, as offering the most direct course to the Lake, thence down the valley of that stream to the Maumee; or across the country to the foot of the rapids, as might upon examination appear most expedient. The canal line south from the summit would probably cross Mad river near its mouth, thence pursuing the valley of the Great Miami to a point where it may be thrown into the valley of Mill creek, thence along that valley to Cincinnati. The waters of Mad river may be thrown into this line near Dayton, and those of the Great Miami below, and being conducted in sufficient quantities to the termination of the canal at Cincinnati, would afford power for extensive and valuable hydraulic works which are there much needed.

This line of canal would pass through a section of country inferior to none in America, in the fertility of its soil or the quantity of surplus productions it is capable of sending to market. That part of the canal between Dayton and Cincinnati, may be with great ease supplied with water; could probably be constructed for a moderate expence, and would become a source of immediate and extensive profit.

That section of this route extending from the summit to the Maumee or the Lake, must be located through a country, at present, mostly unsettled, but may at a day not far distant, be advantageously adopted. It will connect itself with a line of commercial intercourse from the state of Indiana to the Lake, by the Wabash and Maumee rivers, which is supposed to offer great facilities for canalling.

In relation to the general policy of constructing canals, wherever the features of the country will permit, and commercial intercourse may demand, no change of sentiment has taken place, except a more thorough conviction of their utility and profit, which has been the result of further investigation, and of information derived from experience. The decided preference which canals possess over every method hitherto devised for the improvement of inland communication, is becoming every day more apparent. The construction of the Grand canal in New York, has thrown additional light on the science of canalling, and more strongly illustrated its benefits, than any other work of the kind ever performed.

Difficulties have there been encountered and overcome, of which no adequate idea can be formed, without an actual inspection of the work; and in comparison with which, the most serious obstructions presented to the construction of a canal across this state, dwindle into comparative insignificance. In viewing this work, we behold what a single member of our confederacy can, in a few years unassisted perform, by calling forth and directing with wisdom, the energies of the people. We here behold a community of self governed individuals of comparatively recent establishment undertaking and accomplishing a work, which would have immortalized the greatest and most absolute monarch on earth, with the wealth and power of an empire at his command. Is there a citizen of the United States, who is not proud of this mighty effort of his countrymen, or one who does not wish to see the state of which he is a member, imitate so noble an example.

Few things contribute so much to the honor and prosperity of a state, as a strong attachment of her citizens to their common country, to its government, its institutions and its character. This is the secret chain which binds together in one great family, the numerous individuals of which a state or a nation is composed; the secret spring which makes them alive to the general interest of the community; to its honor and reputation, and ready to make personal sacrifices for the promotion of public good. Without this feeling a state is composed of a multitude of uncongenial spirits, held together rather by necessity than from choice, and continually neutralizing any effort which may be attempted, by clashing interests or jealous animosities.

No nation has ever become great without some national character; some general affections of the people, some object to excite the pride of her citizens. Perhaps no better method can be devised to accomplish this object, than to design and pursue with stability some leading measures of state policy; some great work which will call forth the exertions, concentrate the affections of her citizens, and even flatter their laudable ambition; some effort in which all may feel a common interest; some achievement, which will cause a glow of exultation in every bosom, at the thought of belonging to a state, that has merited the admiration of the world.

Though the construction of the great canal of New York is a work so grand and imposing, its advantages to the public are not less apparent. The benefits of which have already resulted from that work, although it is not yet completed, are so great, as to stagger belief, if they were not capable of proof amounting almost to mathematical demonstration.

That every saving in the expence of transporting the surplus productions of a country to market, is just so much added to the value at home; is a proposition too evident to require proof, and too plain to need illustration. We accordingly find that any article designed for distant market, increases in price, where it is produced, in exact proportion to the diminution in the expence of conveying it to its place of destination, unless affected by accidental circumstances. Taking this rule as a criterion, it is ascertained by information derived from authentic sources, that on the productions of the country exported from the single county of Monroe, situated on the Genesee river in New York, and the property received in return, more than 275,000 dollars, was saved during the last season; in other words, so much money was put into the pockets of those who raised that produce for market and those who received such articles as they needed in return. This benefit has resulted solely from the Erie canal, and the sum thus saved to a small section of country, would more than pay the interest for one year on all moneys expended in the construction of all the canal lines in that state, which were then completed. This fact alone, speaks volumes in favor of canal navigation, and ought to carry conviction to the mind of every reflecting man.—

(Note III.)

It is found from observations made on the New York canal, during the last summer, that one horse of a medium value is capable of moving on the canal a boat containing twenty-five tons of freight at the average rate of 25 miles per day. When we consider the number of horses, wagons and men required to move the same weight an equal distance on the best roads, we shall cease to wonder at the diminution in the price of conveying produce to market by a canal navigation, and its consequent increase in value, where it is produced.

Wheat of which there were near 500,000 bushels, floured at the mills in and near Rochester on the Genesee river, during one year ending in November last, was worth no more than 50 cents per bushel, before its price was affected by canal navigation. During the past season it has commanded in Rochester, from 94 to 105 cents per bushel, owing entirely to the canal navigation, between that place and the Hudson river.

We are apt to consider works, with which we are unacquainted, as fraught with difficulty in their construction, and of doubtful utility, when completed. Thus we view the making of a turnpike road of the most perfect kind, as a measure within the reach of a small company, for they are common in some parts of our country; whilst a canal of the same extent, is thought to require an exertion, which none but a powerful nation, or an absolute monarch is capable of making; for canalling is a science to which, until lately we were strangers, and even now, a knowledge of it is but partially diffused. Yet experience has shewn, that a canal on favorable ground, can be constructed, nearly as cheap as a turnpike road properly formed of stone; that the canal is most easily kept in repair, and that the facilities which it affords for the transportation of property, are ten times as great.

Many people seem to think that every dollar expended in public improvements, is so much lost to society; that it is annihilated; gone out of existence never more to return. Such opinions are founded in error. Even public works, which are erected for mere show and ostentation, which afford no profit and are of no practical benefit when completed, do not necessarily diminish the wealth of the community by whom they are constructed; if to effect these objects, the rich are taxed, money is drawn from the secret recesses in which it has long lain useless; the labor of those, who would otherwise have remained idle, is put in requisition, and by this labor alone the work is erected; the money still remains in the country, but has only changed hands, generally for the better. If then a work useless in itself, does not necessarily detract from the wealth of the community; one of great public utility, can hardly fail to add to that wealth. It is believed by many men of extensive knowledge and enlarged political views, in New York, that the construction of their great canals, would be beneficial to that state, even admitting those works to be abandoned the moment they are completed. Such has been the general spring given to industry; such the amount of labor put in requisition, which would not otherwise have been called forth; such the benefit arising from the distribution of money in the best possible manner, that the inhabitants are now better able to pay the interest on all moneys borrowed for that work, than they would otherwise have been to pay their ordinary tax without it. But fortunately this is not required of them. They now reap the benefits of that magnificent undertaking, without even feeling that they are taxed to pay the interest of the moneys expended in its construction.

It may be believed by many, that a state so new as Ohio, and one having under its control so small an amount of public funds, is not able to undertake a work so great as that of uniting the Ohio with Lake Erie by means of a navigable canal. But let it be remembered, that very little except labor is required to accomplish the object, and nothing which this state will not yield in abundance. Many of our citizens are now idle, or employ but a small

portion of their time in productive industry, for the want of a proper stimulus to call forth their exertions. This state possesses generally, a soil of exuberant fertility, and a climate favorable to bring forth the productions of the earth; but a small portion of the labor of her citizens is required to supply them with the necessaries of life. And such is the difficulty and expence of transporting to market the surplus produce of our soil especially in the interior of the state, that little inducement is offered to more constant industry. Admitting that one tenth part, of the aggregate time of the citizens of this state, who are able to labor, is unemployed; and one third of this unemployed time, or capacity for labor, is annually put in requisition, and skillfully directed for six years, the proposed work might be accomplished without diminishing in the smallest degree, the productive industry which is applied to other objects.

When, we may ask, was a nation ever impoverished, in consequence of the construction of works which had for their object public utility or convenience? We may safely challenge the history of the world, to produce an example of this. Perhaps nothing has so much contributed to national wealth and prosperity, as the construction of roads and canals. They not only add to the value of the articles transported on them; but give a powerful stimulus to industry, by increasing its profits. Let it also be remembered, that as we reduce the labor expended in the transportation of any article there remains so much more, which may be applied to the production of that article.

A nation is not always rich in proportion to the gold and silver in her possession; but in proportion to the productive industry of her citizens. Spain and England are examples of this; the one, possessing for centuries, the exhaustless mines of the new world, has been continually poor; while the other without a single mine of gold or silver has been able, from the industry of her citizens, to subsidise kingdoms and wield at pleasure the destinies of Europe.

If "population be strength, and industry be wealth," as has been justly said; Ohio even now is both powerful and rich. Possessing a free population of 700,000 inhabitants, more than 100,000 of whom are men able and willing to labor; we ought rather to ask, "what can she not do?" than doubt her ability to perform the work proposed. (Note IV.)

The only difficulty exists in calling forth the real wealth and energies of the people, in putting in requisition the labor required for the construction of the canal. The most convenient, and almost the only method, which can be resorted to in free states, is by the intervention of money. But if it be settled that the work when finished, will within a reasonable time, pay the interest of the money required for its accomplishment, and will eventually redeem the capital; no difficulty can exist in the attainment of this object; and if the work will not do this, it ought not to be undertaken.

Satisfactory assurances were received by one of the acting commissioners, Mr Williams, when in New York in November last, that any sum of money required, in the construction of a canal from the Lake to the Ohio, might be obtained on loans, at a moderate rate of interest, and on reasonable terms in other respects. A number of communications on that subject are herewith submitted. (Note V.)

If then the money required to accomplish the proposed work can be obtained, and the physical ability of the state be sufficient to effect the object, the pecuniary profit of the canal, is the only question that admits of controversy; for no doubt can be entertained of its utility.

In relation to the profits of the proposed canal, we cannot speak with certainty at this time, not being prepared to lay before the General Assembly, a complete estimate of the expence on any of the proposed routes. It may,

however, be observed that few instances have ever occurred of canal stock being unproductive. And in these instances, the canals were either badly projected, or the business on them has failed for want of water, or from some other canals being made in their immediate vicinity, which has drawn the commerce from them. The canal stocks of England are now worth on an average more than 600 per cent. on their costs; of these stocks a more detailed statement is given in the annexed table.

When we consider the geographical position of Ohio; being, as it is, the connecting link between the eastern and western states; between the great inland seas on the north and the navigable waters of the Mississippi on the south; the fertility of its soil the mildness of its climate, its extensive and rapidly increasing population; we can entertain little doubt that a canal through the state, connecting the waters of Lake Erie, with those of the Ohio river, must become the channel of an extensive commerce, and the source of great revenue to the proprietors.

Some of the peculiar advantages which would result from a canal connecting Lake Erie with the Ohio, may with propriety be noticed. Coarse or alum salt, is now made in large quantities at the Onondago works, in the state of New York, and this manufactory is rapidly increasing and may be carried to any extent which the demand can justify. This salt may be delivered on the south shore of Lake Erie, after the Grand canal of New York is completed, for 30 cents per bushel, and on the Ohio, by means of a canal through this state, at 37½ cents. Gypsum or plaister, with which the shores of Lake Erie abound, may also be transported to the interior of this state, or any part of the Ohio valley, at a very low rate, and in any amount required. Whilst the countries bordering on the Lakes, and the western part of New York, which are destitute of mineral coal, may be supplied with that article from the Muskingum or Ohio vallies. This branch of trade alone must necessarily produce a great revenue. (Note VI.)

Should the contemplated works be completed; we shall see canal boats of the proper construction to withstand the effect of winds on the large waters, towed by steamboats up the Ohio to the southern termination of the Ohio canal; thence through that canal by horse power; across Lake Erie by steam boats, through the Grand canal in New York in the ordinary manner to the Hudson, then by steamboats to New York. In returning, they will pass in the manner before described to the place of destination on the Ohio. Thus conveying their freight through the whole length of the route without relading. Canal boats, after passing from the canal into the Cuyahoga* Lake, are now towed by steamboats to the south end of that Lake, a distance of about 40 miles. But we forbear going into detail on this subject, as we are not prepared at this time, to lay before the General Assembly, a financial system, for the accomplishment of the proposed work.

We are decidedly of opinion, that the proposed canal, if undertaken at all, should be made by the state. Every great work of this kind, in which the welfare of the public is so deeply concerned, should be under the control of the government, and not of a private company, where the object can be effected without resorting to the latter alternative.

We beg leave again to call the attention of the General Assembly to the school lands, as a fund which in its present situation must ever be unproductive, and which if vested in a canal stock, under the guarantee of the state, will aid in the construction of a work of the first importance, and at the same time form a fund from which a much greater revenue may be drawn for the support of schools, than can ever be drawn from that fund, under the present

*The official document has been followed; but it is believed that the word "Cuyahoga" should have been written Cayuga—meaning thereby, the small lake of that name in the state of New York.—EDITOR.

plan. This subject having been fully investigated by a joint committee, raised for that purpose in the last General Assembly, it will be unnecessary here to give our views in detail.

As a general plan of operations for the ensuing season, the board of commissioners propose to finish the locations and estimates on the Muskingum and Scioto route; to locate and estimate the expence of a canal line on the western route; to test the quantity of water, furnished by streams proposed as feeders to the several summits by reguaging them at the proper season. To make further examinations and investigations of any plan which may appear feasible for supplying with water the summit pound of the Sandusky and Scioto route; and such further examinations and surveys as they may deem expedient, or as the General Assembly may think proper to direct.

Although we have been prevented from completing the surveys, contemplated to be made during the last season; yet much useful and interesting information has been obtained; and it is presumed that more topographical information has been collected of this state in the course of our examinations than is possessed by any other state in our Union.

In order to enable the board to complete the proposed surveys and estimates which yet remain unexecuted, we would respectfully recommend a further appropriation of five thousand dollars. With this sum the examinations, surveys and estimates may probably be completed; and if not prevented by unavoidable accident, we hope to be able to lay before the next General Assembly, such information as will enable them to determine on the proper route and plan of a canal, connecting the Lake with the Ohio river, and to commence the work the next season thereafter, if deemed expedient.

The commissioners have deemed it important in the course of their surveys and examinations to raise up a corps of engineers, who will consider themselves identified with the interest of the state and on whom we may in all our future cases rely. With this view they have employed (in addition to Mr Samuel Forrer, to whose exertions and intelligence we are indebted for the progress already made) Mr John Forrer and Mr Byron Kilbourne, as assistants, both of whom have evinced a degree of information, judgment and activity, which promises to make them highly useful and respectable as engineers, when they have obtained the requisite experience and practical knowledge.

All which is respectfully submitted,

T. WORTHINGTON,
BENJ. TAPPAN,
E. BUCKINGHAM, Junr,
ISAAC MINOR,
ALFRED KELLEY,
M. T. WILLIAMS.

Columbus, January 21, 1824.

APPENDIX.

NOTE I.

Streams are gauged by throwing dams across them which will force the water to run through a notch of certain dimensions in a plank which is placed in the dam. This notch is made by cutting into its upper edge, making the sides of the notch perpendicular and its bottom level: The plank is placed across the stream, with the edge which remains uncut at the bottom, and forms part of the dam. The water being prevented from passing under the plank or around its ends is forced to run through the notch, and being unconfined above will rise on the up-stream side of the plank or dam, until the whole natural stream is discharged through the notch, when it will then cease to rise. The depth of the water running through the notch is then measured, and from this measure the quantity of water discharged per minute is estimated. For this purpose, tables which are the result of actual experiments

and measurement are used. Thus it is found, that when the water runs through a 12 inch guage, in other words through a notch of 12 inches horizontal width, to the depth of 6 inches. 71 cubic feet and 40 hundredths of a foot are discharged per minute. If it runs through the same guage 12 inches deep, 137 10-100 cubic feet of water per minute are discharged.

When streams are too large to be guaged without great inconvenience, the quantity of water is estimated by measuring the breadth and depth of the stream at some place where these are nearly uniform for some distance, and the velocity of the current or the number of feet it moves forward in a minute or any other given length of time, making due allowance for the eddies and friction at the sides and bottom of the stream. Thus a stream of 10 feet medium breadth and one foot medium depth, running 60 feet per minute will yield or pass 600 cubic feet of water in that time.

In order to determine the true value of streams, they should be guaged or measured after a long drouth and when they are the lowest, or discharge the least water.

NOTE II.

Copy of a communication to D. S. Bates, Esq. and his answer.

COLUMBUS, JANUARY 14, 1824.

To DAVID S. BATES, Esq. *Civil Engineer.*

Dear Sir:

Two methods have been proposed for supplying with water the summit pound of the Sandusky and Scioto route, in this state, and the lower levels dependent on the summit pound for supply. The line of canal which is required to be thus supplied may be assumed as 50 miles in length.

By one method of supplying this line the following streams can be commanded, which in August and September last would furnish the number of cubic feet per minute set opposite to them respectively, in the following statement:

Sandusky river,	guaged,	220 feet
Scioto,	measured,	26
Little Scioto,	estimated,	50
Main Branch Great Miami,	guaged,	63
Cherokee run,	do.	190
Buckingelas,	do.	470
Stony creek measured 630 feet; of this 350 feet per minute may be obtained.		350

Aggregate number of cubic feet, 1369 per minute.

To conduct this water to the summit 40 miles of artificial feeders and 40 miles of the channel of the Scioto would be required.

The other method proposed is to introduce the waters of Mad river and the Great Miami into the summit pound by feeders, the aggregate length of which will be about 150 miles, about 130 miles of which it is proposed to make navigable. This is in addition to the 50 miles on the Sandusky and Scioto line.

The quantity of water thus obtained may be estimated as follows:

Mad river measured and estimated at 6000 cubic feet per minute,	6000
Great Miami measured and estimated at	2 00
There may be obtained between these two rivers in addition.	1000 feet in
Aggregate number of cubic feet per minute,	9100

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY, BY JOHN KILBOURN, AT \$3 A YEAR. IN ADVANCE.

VOL. I. COLUMBUS, OHIO, SATURDAY, JULY 23, 1828. NO. 6.

Readers will notice that the Canal Documents are continued on the third page of every number, from the last page of the preceding number.

Several papers, from various parts of this State, and from the state of New York, have been received at this office, with a request to exchange. While we feel complimented, and grateful to our brethren of the press, for this indication of their favorable opinion of this publication; yet our limited pecuniary means will not allow of an extended exchange list, however consonant, such a measure might be to our feelings.

The nature of this publication being such that all advertisements are excluded; from which printers generally obtain a considerable item of support, we are obliged to ask a somewhat higher price than other country papers.—As we expect to pay the difference, between the value of this paper, and the National Intelligencer, Niles' Weekly Register, &c. so we deem it no more than right to require the same in opposite cases. When this condition is attended to, we shall, generally, feel disposed to exchange, with those who may so wish.

lest the foregoing remarks should seem to savor too much of personal vanity, it shall also be remarked that some to whom we have sent, have not deigned a return—for instance, the editor of the Scioto Gazette at Chillicothe, did not send his, until this had been continued above a month: nor has the Cleveland Herald ever yet been received, although this has been regularly sent from its commencement.

Although there are eighty weekly Newspapers published in Ohio; yet we have not sent to more than nine or ten of them; and these have been selected, mostly, on account of their location on some canal line, through the medium of which, weekly notices might be obtained of the progress of these works.

Here we venture to suggest to editors, residing contiguous to the two canals in Ohio, the expediency of furnishing a weekly paragraph of notices of the amount of tolls received the week preceding—and of the number of arrivals and departures of boats during said period, where the canals are finished—and a passing notice of the progress of those works, where not completed. In these particulars our Ohio publishers of papers are not yet so attentive as the printers in the state of New York are to their canals. Some of the Cincinnati papers however have, occasionally, adverted to these subjects: as has the Cleveland Herald; and this circumstance occasions the more regret that that paper has not been received.

We respectfully, and earnestly request that those citizens, friendly to this publication, would extend their aid to increase the subscription list; as we have not yet one half enough to pay its, weekly expences, although they are gradually increasing. Advance payments alone are wanted: but subscriptions for a half year will be received; which will amount to only \$1.50 each. Within this period, as stated in the prospectus, all the canal documents, to the present time, are expected to be introduced. These will make an octavo volume of above 400 pages; and will be completed, about the middle of December next. All the back numbers will be furnished, so as to make the work complete.

Any citizen, who will obtain subscribers, for six copies, and remit the money in advance (\$9.00 for half a year, or \$18 for a year,) shall receive a seventh without any charge; and proportionably, for a greater number.

Companies of eight individuals, in any one town or village, who shall remit ten dollars, free of expence, shall each be furnished by mail with the first half year of the work, which will embrace all the canal documents, as beforementioned: and for a longer time at the same rate.

Those few subscribers, who have not paid, are respectfully requested to transmit their respective dues, according to the terms: as all the sums due, and more are necessary for the continuance of this publication.

In the hopes of extending the circulation of this paper, the following recommendation has been obtained, and is here presented to the public.

WE the undersigned having examined the five numbers, already printed, of a weekly publication by John Kilbourn, entitled the *Civil Engineer and Herald of Internal Improvement*; and believing it to be a useful work and worthy of support; and especially so, until the official Ohio Canal Documents shall have been all published, in chronological order as they are already commenced, we do hereby cordially recommend it to the patronage of all our fellow citizens, throughout this state, who take an interest in these public works.

ISAAC MINOR,

President of the Board of Canal Commissioners.

JER. McLENE,

Secretary of State.

H. BROWN,

State Treasurer.

R. OSBORN, Auditor,

WM COOLMAN, jr.

Representative from Portage co

Columbus, 23d July, 1828.

OHIO STATE LOTTERY.

Under this imposing caption, we have noticed an advertisement in the Lancaster and several other papers, of a lottery, granted last winter for the relief of *Elisha Barrett*, who has had his woollen factory destroyed by fire.

Although not friendly to lotteries generally, yet we had thought of purchasing a ticket in this one, to aid its benevolent object. But when we came to examine the scheme; and to perceive therein, such an apparently wide departure from the explicit requisitions of the law authorizing the lottery, we not only shall not purchase any ticket therein, but shall, under a sense of duty to community, warn others, against throwing their money into this vortex of private speculation.

It is generally understood, among those conversant with the subject, that all the monies received by the managers of lotteries generally, at the scheme price, shall be drawn out in prizes; which prizes are subject, however to a discount of 15 per cent;—which sum thus discounted, is to go to the object of such lotteries; and to pay the necessary expenses attending them. So that a person buying a ticket, shall not be but fifteen per cent more foolish than he who buys none: and where the object is a benevolent one, many people are willing to buy tickets, with the chance of fifteen per cent against them, to aid some public or private charity.

But, in the scheme now under consideration, there are 14,194 tickets, at three dollars each, amounting to \$42,582: while only \$32,204 are drawn out in prizes: and then there are 15 per cent discount on these prizes.

This sum of 15 per cent, out of \$32,204, amounts to \$4,830.60, which goes to *Elisha Barrett*—while \$10,388, (the difference between the total amount of all the tickets at 3 dollars each, and the total amount drawn out in prizes,) goes into the pockets of the managers, and those in their employ.

It amounts, substantially, to this—the legislature grants *Elisha Barrett* the privilege of raising, by lottery, a tax off community, of \$4,830; and then he taxes the people \$10,388 to pay his collector:—or, it is like a county, which should give its own county collector \$10,388, for collecting only 4,830 dollars: or above 215 per centum for collection fees!!

Now what county, or private individual would act so "ineffably stupid."

In fact, a person who purchases a ticket in this lottery, while he thinks he is meeting a chance of only the discount of 15 per cent against him, does, in fact, pit himself against 36 per cent dead loss. Of this sum 21 per cent goes to the managers, as before shown; and only 15 per cent to the individual for whose benefit the lottery was granted. Indeed *Barrett* does not get 15 per cent of all the money paid for tickets; but only 15 per cent on the sum drawn out in prizes. And this sum, as we have before seen, is \$10,388 less than the total amount paid for tickets.

Of each and every ticket, which any person buys in this lottery, above 73 cents go to enrich the managers aforesaid: and only 34 cents 3 mills, to *Elisha Barrett*,—while \$1.92 cents only, are returned to the purchas-

ers of tickets, in the shape of prizes. This sum of \$0.34 cents, we have ready to contribute to some suitable trustee, for the object of re-building the Factory: but not a dollar to give the managers for tickets in this lottery.

SUMMER TRAVELLING.

(Continued from last week.)

But the principal scenes of grandeur, both of nature and art, are to be seen, by taking, either the stage, or the canal at Buffalo, and following along the eastern bank of the broad Niagara river to Tonawanta, at the mouth of a large creek of that name, 12 miles.—Opposite this place, lies grand island, twelve miles long, and extending north to within two miles of Niagara Falls. On this island, within fair view of the village of Tonawanta, is the place selected by M. M. Noah, editor of the New York Enquirer, self-styled judge of Israel, &c. for the site of his town of Ararat, where he proposed to collect the Jewish nation.

From this place the canal leaves the Niagara river and takes the bed of Tonawanta creek, with a tow path along its southern bank to the village of Pendleton, 12 miles; where the canal again commences, and passes through the "mountain ridge" 7 miles further to Lockport, the seat of justice for Niagara county. The canal is here cut through the ridge, for more than three miles about fifty feet deep, 30 of which is solid rock.

By taking the stage at Tonawanta, and travelling along the eastern margin of Niagara river ten miles northwardly, you arrive at the neat little village of Mauchester, at the great falls.—Here is one of the best hotels in the United States, where the stage stops. By a short walk of from 50 to 100 rods, you arrive in full view of the stupendous cataract of Niagara. The whole river, which is one of the largest in the world, is here precipitated 150 feet perpendicularly, into a rocky abyss of that depth below. But as this fall has been so often described, and by abler hands, no particular description will here be attempted.

By taking the stage again, and travelling eastwardly 27 miles, you arrive at Lockport. Here are five double combined locks on the canal, of 12 feet descent each: with a never failing supply of water from Lake Erie. These locks, and the rock-cutting through the "mountain ridge" just above them, are justly esteemed among the wonders of the world.

From Lockport, passing the villages of New-
port, Holly, and Brockport you arrive at Rochester, 64 miles. Here is an immense stone aqueduct, for the canal, across the Genesee river. "It is founded on solid rock, supported by 11 arches of masonry, the trunk and all of brown stone." Nine of the arches are of 50 feet span, each; and two others of 40 feet each. It was built in 1822—3, under the superintendence of the engineer Judge Bates.

Rochester, is increasing in population, business and wealth in proportion to its size, probably, faster than any other town in America.

It must be observed that in this estimate are included the waters of Stony creek, Buckingelas, Cherokee run and main branch of the Great Miami, which were proposed to be introduced by the other method, which will leave only 296 feet per minute to be introduced by the method first proposed.

Can this summit be supplied with water by either of the above methods? Please to give us your opinion on the subject, and the views which are the result of your knowledge and experience in the history of canalling.

Very respectfully,

ALFRED KELLEY, }
M. T. WILLIAMS, } *Acting Comm'rs.*

MESSRS KELLEY AND WILLIAMS,

Comm'rs of Canals, Ohio.

GENTLEMEN—I have examined the subject of supplying the Scioto and Sandusky line of canal at its summit, and such levels annexed to it, as do not receive any supply except through the summit.

This line, per statement, is 50 miles long, and the exposed line of feeder and natural river 80. Judging from the actual expence of water on the Erie canal, I should think that the supply of 1369 feet of water here introduced, will be entirely insufficient. Sixty miles of canal, within my knowledge receives more than four times that amount for its supply, and I am of opinion will want extensive additional feeders.

In reply to the second part of your communication, would state that, although 9396 feet of water per minute is by this measure obtained from Mad river and the Miami, yet the addition of 130 miles of canal and 20 miles of feeder will do away the benefit to be expected from this water, and there will be after all a very great deficiency.

The New York canal is fed in one instance 61 or 2 miles with about 6000 cubic feet of water; in another part of 70 miles, by about 10,000 feet; in another of 11 or 12 miles with about 2000 feet—and I can freely say, that on these levels there is no water to spare in the dry season of the year.

The distance I have mentioned above is 143 miles of Erie canal, fed by 18,000 cubic feet of water per minute. The line in your state of navigable canal 180, and unnavigable feeder 20, in all 200 miles to be supplied with about half the amount which supplies less than three fourths of that distance in New York, and we have no surplus in that state. I mean to state, that every drop received in that line of canal in New York is necessary, and from that impression, will state the question as follows:

If 143 miles of canal require 18,000 cubic feet of water per minute, how much will 200 miles of canal require? The answer is, 25,246 feet

The supply actually to be received is, 9,396

Leaving, 15,850 cubic feet deficiency per minute on this canal.

I am of opinion that no method can be devised to make this canal useful with a less quantity than is above stated, unless by artificial pounds, and they would require to be so extensive as to cost perhaps as much as a whole canal will cost when such helps are not needed.

I have thought of inclined planes; but on reflection these could not succeed; the deficiency is too great; more would be required to supply evaporation and absorption in this length than is received.

I am with much regard your obedient servant,

D. S. BATES, *Eng'r.*

January 15, 1824.

NOTE III.

Statement showing the amount of profits to the county of Monroe, New York, arising from the advantages of canal navigation, during the year ending in November last.

494,000 bushels of wheat were manufactured at the Rochester mills during the year ending as aforesaid, which previous to the completion of the Erie canal to that place, was worth but 50 cents per bushel, \$247,000

Average value of wheat at Rochester, for the year past, 94 cents per bushel,	464,360	
	<hr/>	217,360

2,000 tons merchandize, &c. brought up, at a saving, in consequence of canal navigation, of \$24 per ton	48,000
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Property not marketable heretofore, viz: Staves, Heading, Tanners' Bark, Plaister, Rails, Posts, &c.	10,000
	<hr/>

\$275,360

Showing a profit in one year of \$275,360 to the agricultural interests of this district of country, the business of which is done at Rochester, occasioned by the difference between canal navigation and the former mode of transportation.

The material facts on which the above estimate is founded were obtained at Rochester, from citizens of the first respectability, who had the means of knowing their correctness.

It may also be remarked that there has been no material change in the foreign demand for our breadstuffs within the time above stated, which could have produced the difference in the value of wheat at Rochester.

NOTE IV.

From the returns of the number of free white male inhabitants in this state over the age of 21 years, it appears that the whole number in June last, agreeably to the returns made was 124,724. No returns were made by the listers of three townships; number could not have been less than 125,000.

The aggregate number returned in the year 1819 was less than 100,000. These returns show an increase of over 25 per cent. within the four years ending in June last, of the free white males over twenty-one years.

Admitting that the aggregate population has increased in the same ratio, the population of Ohio may now be stated in round numbers at 700,000—and should the population go on to increase in the same ratio, the state will contain in the year 1830 one million twelve thousand inhabitants.

Considering the effect which will be produced in the northern part of the state by the completion of the New York grand canal, the above calculation will probably be realized, especially if this state undertakes the construction of a canal from the Lake to the Ohio river.

NOTE V.

Copy of letters addressed to Dewitt Clinton, President of the Board of Canal Commissioners of the state of New York, and to Cadwallader D. Colden, Esq. of the city of New York, with their answers.

NEW YORK, Nov. 8th, 1823.

SIR—Fully sensible of the deep interest that you take in internal improvements I have the honor to solicit your opinion on a subject of primary importance to the western states, and to the United States in general.

It is in contemplation by the state of Ohio to make a canal connecting Lake Erie and the Ohio river; and surveys and explorations are now taking place

with a view to that important object. As the funds for this purpose can only, as in the case of the New York canals, be raised by loans, I would wish to obtain information on the following points, to wit:

Whether in your opinion, funds can, say in two years from this time, be obtained by loans at different periods, as may be required to the amount of \$2,500,000, on the credit and in behalf of the state of Ohio, at an interest of six per cent. per annum, by giving satisfactory assurances for paying the interest semi-annually, and reimbursing the principal at the expiration of thirty years?

It would also be highly gratifying and perhaps materially useful to have your judgment on the practicability, physical as well as financial, of the proposed undertaking; as well as your views of the advantages that will be derived from its completion.

You will take into view that the state of Ohio is free from debt; that her soil and her climate are excellent; that her territory is extensive; that her population, next to New York, will soon be the most numerous in the Union; that the canal will, in all probability be lucrative and productive in proportion to its cost, as that of New York; and that the revenue derivable from it may be pledged to the holders of the debt until it is extinguished.

Very respectfully,

MICAJAH T. WILLIAMS.

NEW YORK, 8th Nov. 1823.

SIR—Your communication of this day covers a wide field of inquiry, and embraces many important considerations. I shall endeavor to give a prompt and explicit, and I hope satisfactory, reply.

The projected canal between Lake Erie and the Ohio river, will, in connexion with the New York canals form a navigable communication between the Bay of New York, the Gulf of Mexico and the Gulf of St. Lawrence; of course it will embrace within its influence, the greater part of the United States and of the Canadas. The advantages of a canal of this description are so obvious, so striking, so numerous and so extensive, that it is a work of supererogation to bring them into view. The state of Ohio, from the fertility of its soil, the benignity of its climate, and its geographical position, must always contain a dense population, and the products and consumptions of its inhabitants, must forever form a lucrative and extensive inland trade, exciting the powers of productive industry and communicating alimnt and energy to external commerce. But when we consider that this canal will open a way to the great rivers that fall into the Mississippi, that it will be felt, not only in the immense valley of that river, but as far west as the Rocky Mountains and the borders of Mexico; and that it will communicate with our great inland seas and their tributary rivers, with the ocean in various routes, and with the most productive regions of America. There can be no question respecting the blessings that it will produce, the riches that it will create, and the energies that it will call into activity.

It must be obvious that there can be no insurmountable physical difficulties to the opening of this canal, if there be a sufficiency of water on the summit level, and the researches which have been made, establish an abundant supply beyond the possibility of doubt. The only questions that can present themselves are those of comparative difficulty, expence, accommodation and productiveness in the designation of a route; and this must be committed to the decision of able engineers.

I should suppose that the maximum cost of this improvement will not exceed two millions five hundred thousand dollars. In five years, by an annual expenditure of five hundred thousand dollars, this work may be advantageously completed. At a rate of six per cent. there would be wanted

20,000 dollars to pay the first year's interest; the second year 60,000 dollars; the third year 90,000; the fourth year 120,000, and the fifth year 150,000. The only financial difficulty in my opinion will be the procurement of funds for the payment of the interest. If the canal be commenced on the Lake side, every step of its progress will open a more extended navigation, and be the means of producing revenue, and at the termination of the five years, the profits of the canal will not only defray the interest, but produce a surplus revenue applicable to other objects.

Supposing this canal to be 200 miles in extent, it could undoubtedly by a vigorous effort, be finished in two years, but it is advisable to extend the period to five years. The banks will, in that case, become consolidated before much use. As the operation proceeds, there will be an augmentation of skill and an acquisition of experience, which will produce economy and improved workmanship; and as one fifth of the whole sum, will in this case, be only required for each year, the pecuniary advances that are essential will not be so onerous as if made within a shorter period, and it ought to be recollected that the Erie canal will be completed next year—that Ohio can then avail herself of the aid of able engineers and skillful contractors, and that an undertaking conducted under such auspices, will propitiate public opinion, and secure the confidence of capitalists, who are disposed to embark their funds in the enterprise.

I shall now proceed to answer the following interrogatory:—"Whether in my opinion funds can, say in two years from this time, be obtained by loans at different periods, as may be required, to the amount of two millions five hundred thousand dollars, on the credit and in behalf of the state of Ohio, at an interest of six per cent. per annum, by giving satisfactory assurances for paying the interest semi-annually, and reimbursing the principal at the termination of thirty years?"

I have no hesitation in answering affirmatively. I have no doubt but that funds to the extent specified and on the terms proposed, may be procured.

The requisite loan may be obtained either in Europe or in this country.

It will be recollected that there is a vast disposable unemployed capital in Great Britain. The finances of that country are in a state of improvement, and in a period of peace, she now requires no loans. The greatest borrower is consequently out of the market. The moneyed men in Europe have therefore accommodated France, Austria, Russia and some of the governments in South America, with extensive loans; and certainly none of them affords such ample security for reimbursement as the state of Ohio.

The moral and political institutions of Ohio are all propitious to the observance of good faith; her population is respectable in number, and exceeded by none in elevation of character; her government has been wisely administered; and she cherishes with enthusiasm, that spirit of liberty and independence, which is connected with the best interests of man and the most flourishing condition of states.

Next to New York, Ohio will be the most populous state in the Union.—She is susceptible of a population of twelve and a half millions, contains thirty-nine thousand square miles, and has every facility for carrying the pursuits of productive industry to the highest pitch of improvement. She therefore presents all the leading inducements for the confidence of capitalists. She does not owe a cent, and can, it is hoped, so arrange her financial affairs as to meet the interest of the loans. At the termination of one year, New York will have no further occasion for loans; and in two years, a considerable portion of the funded debt of the United States will be paid off. Capitalists can then find no better place of investment than Ohio.

If two millions and a half are borrowed, every square mile in Ohio will only be answerable for sixty-four dollars. What an ample security for so

small a sum! and it will be recollected that when this canal is perfected, it will, by the markets which it opens, increase the value of lands almost immediately fifty per cent. and diffuse the blessings of opulence over the whole country.

In one word, sir, all that is necessary to complete this great enterprise is the will to direct it. Considering as I always have, that it is only a continuation of the Erie canal—that it will promote correspondent advantages—and that it is identified with the stability of our government and the prosperity of our country, I own that I feel a more than common solicitude on this subject.

I have the honor to be very respectfully,

Your most obedient servant,

DEWITT CLINTON.

MICAJAH T. WILLIAMS, Esq.

One of the Canal Commissioners of the state of Ohio.

NEW YORK, Nov. 10, 1828.

SIR—It will give me pleasure to afford you any information in my power, on the subject, to which the letter I have had the honor to receive from you relates.

The contemplated canal through your state, is one of those internal improvements which is not only interesting to the whole Union, but is particularly so to this state. It is obvious that we must participate largely in its advantages.

From an early conviction of their practicability, and of what would be their great utility, I have always been an advocate of the great canals which this state has so nearly completed; but I have had no concern in the execution of them. I have therefore no practical information on the subject, and my opinions have no other foundation than general views of what has been accomplished in this state, and of what may be done elsewhere. Neither have my pursuits in life given me any particular acquaintance with money transactions, and my information on this point is also of a general nature. I believe I may say with confidence that there has been no period within the last twenty years, when the sum you mention, that is to say, \$2,500,000 might not have been raised at six per cent. for a long term of years upon what capitalists would call undoubted security. During the war, this may not have been the case; and for short periods when adventitious circumstances, may have produced a temporary press for money, a negotiation of this nature, and to this extent, may not have been practicable. But I speak of an ordinary state of things, such as the present, and I have no doubt I am correct in saying there would be no difficulty in obtaining such a loan as you propose, in this state, upon good security.

The question then occurs as to the proposed security. It seems to me that a pledge of the credit of the state of Ohio, must be considered as the best that could be offered. I am sure it would be so by all who will duly appreciate the extent and fertility of her soil; the astonishing increase of her population and wealth; the moral qualities and intellectual endowments of her inhabitants.

At this day no one doubts the durability of our union. Who can doubt it when we are chained together by such connecting links as that in contemplation. The faith of our national government is considered a better security than any on earth. The pledge of so important a member of that confederacy which commands so much respect and confidence as Ohio, which, though but in her infancy, is even now in point of wealth, strength and political and moral influence among the first of the United States, must be considered as

good security as any pledge that could be offered. It seems to me, also, that this security has this peculiar character to recommend it; that the money borrowed will be added to its value. It will be like lending money to improve the mortgaged premises.

The faith of the state I am sure, ought to be, and I believe will be considered as ample security. But we know that money dealers are fond of having some particular appropriation for the payment of their interest and the reimbursement of their principal. And though these must rest on the faith of the state as much as if there was nothing else pledged, yet I think the loan would be facilitated, if Ohio were to set apart some sources of revenue for the liquidation of the debt she would create and for the punctual payment of the interest.

It is known that previously to the existing war between France and Spain, money was so abundant in Europe that it might be had in large amounts in England, at an interest of three or four per cent. The evidence of this is the loans that have been made to the deeply involved and agitated monarchies of Europe, and to the unsettled and unstable governments of South America. The return of peace on the European Continent will produce, no doubt, its wonted effect on the money market. Indeed it is understood that a late measure of the Bank of England, which enables its stockholders to obtain discounts at four per cent. on the pledge of their stock, has put vast sums in circulation and that now it is not difficult to obtain loans at such a premium as will afford something above the interest required by the Bank.

In consequence of some communications I had with Governor Brown, during the last session of Congress, I have corresponded with Mr Wilkes, the Cashier of the New York Bank, who is now in Europe. The result of that correspondence, my letters to Governor Brown, to which I know you can have access, will shew Mr Wilkes is hourly expected home; no man will be better able to give you full and satisfactory information as to the situation and disposition of the money holders of England than Mr Wilkes. If he should not arrive before your departure, I will be happy to communicate to you by letter, what I may learn from him.

On the physical practicability of the proposed undertaking, I feel some reluctance to offer an opinion while others may be obtained so much more deserving your attention. I know no more of the proposed course of your canal than what is to be learned from very imperfect maps. All obstacles, whatever may be their elevation, may be surmounted by a canal, if sufficient water can be obtained at the greatest heights. The cost of a canal depends on the length and depth of the necessary excavation as well for the bed of the canal as for the requisite feeders, upon the number of locks, culverts, and bridges, and upon the extent of the requisite mounds and aqueducts.

When these are ascertained, what has been done in this state must render the cost of making a given distance of canal, a matter that can be predetermined with the utmost certainty by mere calculation. I can imagine no reason why canalling should cost more in Ohio than it has done in New York; indeed I think there are some circumstances which would induce us to suppose it would cost less. Among these are the advantages that would be derived from the experience our extensive works have afforded. It is not only that the directors and engineers of the Ohio canal may greatly profit by this experience; but should she in the course of a short time, undertake the enterprise, she will undoubtedly find in her employ, workmen and laborers who will carry with them the benefit of long practice with us. The rapidity with which it has been seen on the New York canals, that this work may be performed, cannot but encourage enterprises of the same nature. Nothing was done to either the Northern or Erie canal till the 4th day of July 1817; since that time more than three hundred and sixty miles have been comple-

ted; so that these works have progressed at the rate of more than a mile a week.

As to the advantages of the proposed canal, I fear to express my opinions in their full extent, lest they should be thought chimerical. I can only say that the revenue from the Erie and Champlain canals have, even in the imperfect state of the former, greatly exceeded the expectations of their most sanguine friends.

On the Western canal I have heard, and believe, that more than \$13000 have been received at one lock in a single day, and the revenue from the works for this year, when the navigation upon them has but commenced, will be more than one hundred and fifty thousand dollars. They yield then, already more than one fourth the interest of the whole sum they will cost.

It cannot be doubted, but that in a very short time the revenue will be equal to the whole interest, and by the time the loans become reimbursable, the tolls will afford funds adequate to the extinguishment of the debt. When we look at the vast extent of navigable waters of the east and of the west, and of the south which will be connected by the Ohio canal, and at the boundless regions of fertile country which these waters intersect, it seems to me its productiveness as a great thoroughfare can be as little doubted as the effect it will have to enhance the value of every species of property in the state through which it will pass.

I believe, sir, I have noticed the several points in your letter on which you wished my sentiments. I regret that I cannot make this communication more deserving your attention. Suffer me to add my sincere wishes for the success of the contemplated enterprise, and assurances of the respect with which I am,

Your obedient servant,

CADWALLADER D. COLDEN.

M. T. WILLIAMS, ESQ.

Copies of letters from sundry persons, in reply to notes of inquiry on the subject of loans.

Copy of a letter from Messrs Prime, Ward and Sands, Stock and Exchange Brokers, New York.

NEW YORK, 13th Nov. 1823.

SIR—In reply to the leading question proposed in your note to us of this date, "Whether funds can, in our opinion, say in two years from this time, be obtained by loans at different periods, as may be required, to the amount of two millions five hundred thousand dollars, on the credit and in behalf of the state of Ohio, at an interest of six per cent. per annum, by giving satisfactory assurances for paying the interest semi annually, and reimbursing the principal at the termination of thirty years"—we will observe, that the successful termination of the noble work undertaken by the people of this state, will create a confidence in similar projects if cautiously examined and entered into by the state of Ohio. With satisfactory pledges for the regular payment of the interest and reimbursement of the principal, the interest being made payable, say in this city, quarterly or semi annually, we think it probable, barring unforeseen changes in currencies, and in the demand for money, that a six per cent. stock of the state of Ohio, could at the period mentioned be negotiated at par in this city. Monied people are generally content with a moderate interest, but they look to a perfect security.—Should the state of Ohio determine on the execution of the work referred to, we believe it would excite in the people of this state a good deal of sympathy and enthusiasm; should the spirits of the people be disheartened we

hope and trust they will remember that this their sister state, labored under similar feelings. We, however, knew what a Fulton had done, and throwing aside for the moment party prejudice, we believe in what a Clinton could do. May you, if needful, find among you a Fulton and a Clinton. But we will not intrude on your patience further, except to say that we shall be happy to render any useful service in our power, and that we are,

Very respectfully, sir.

Your very obedient servants,

PRIME, WARD, & SANDS.

MICAJAH T. WILLIAMS, Esq.

Copy of a letter from Thomas Eddy, Esq of the city of New York.

NEW YORK, 11th mo. 15th, 1823.

RESPECTED FRIEND—It has afforded me singular satisfaction to find by thy letter of 8th inst. that making a communication by canal navigation, from Lake Erie to the Ohio river, appears to claim the serious attention of your Legislature. The accomplishment of so noble an undertaking would reflect lasting honor on the enterprising citizens of your state, affording an easy and cheap transportation for the articles of produce, manufactures, and merchandize, materially contribute to consolidate the union of the United States, greatly benefit the state of New York, and would present to the enterprising and industrious, sources of trade to an incalculable amount.

In reply to thy query, whether funds can be obtained by loans to the amount of 2,500,000 dollars on the credit of the state of Ohio, at an interest of six per cent. by giving satisfactory security for paying the interest semi annually, and reimbursing the principal in thirty years, I beg leave to remark, there are some important circumstances that, in my opinion, would make a favorable impression on the minds of monied men, and serve to create a confidence:—1st. The state is at present clear of debt. 2d. It is an important consideration, that the moral character of the state is highly respectable, owing in an eminent degree, to the non-existence of slavery. 3d. The extensiveness of her territory, the richness of her soil, and salubrity of the climate, must ensure a rapid increase of population. Under these considerations, there is not the least doubt in my mind, that a loan, on the terms proposed, might be readily obtained either in England or in this country. In this state we shall not have occasion for further loans after the present year, and in two years a proportion of the United States' loans will be paid off, so that money will be plenty, and on good security readily obtained. If a law should be passed authorizing the proposed loan, I beg leave to offer the following remark for your consideration:—Although it is very true, that any specific appropriations made by the Legislature, will, in fact be no additional security for the due payment of the interest on the loan, yet, in point of policy, it appears to me advisable, that provision should be made, specifying particular objects of revenue, as well as the whole amount of the tolls arising from the canal, to be appropriated as a security for the payment of the interest.

I would respectfully suggest the propriety of your Legislature making an application to Congress for a grant of a portion of land belonging to the United States within your territory. The completing of the proposed canal navigation, would most evidently enhance the value of the remainder of the public lands, and from this consideration, it would certainly be the interest of the United States to make you a liberal donation.

I am with sentiments of respect and esteem,

Thy assured friend,

THOMAS EDDY.

MICAJAH T. WILLIAMS, Esq.

Copy of a letter from A. H. Laurence, Stock and Exchange Broker, New York.

NEW YORK, 14th Nov. 1823.

MICAJAH T. WILLIAMS, Esq.

SIR—On attentively considering the subject you did me the honor to request my opinion upon, in your note of the 11th inst. I beg leave to offer you the following ideas relative to the contemplated canal connecting Lake Erie with the Ohio river.

I believe not only the state but our country at large, is daily becoming more convinced of the utility of artificial navigation; thereby drawing the people of our country nearer to each other; drawing more firm and closer the ties of union, and yielding a revenue equalling the calculations of the most sanguine: This being the case, and it being so universally understood, the projectors have the people with them, they can accomplish with facility what otherwise would be impracticable. That funds could be obtained two years from this time, on the credit of the state of Ohio, I do not think there is the least doubt; but whether on as favorable terms as at this present period, is uncertain; for our money market is pretty abundantly supplied.

Ohio is powerful and rich; and interested as our state is, in having a connexion formed with her, thereby drawing all her immense produce down through the back part of the state, I think our citizens would cheerfully step forward and aid her in her important undertaking. I would therefore suggest, that when the commissioners are prepared, they give notice that on such a day proposals would be received for a loan at six per cent. of dollars, and subscriptions to the same taken at the Bank of or Office of for which the state of Ohio pledges its credit to the final redemption of the principal and interest; particularly if they provide for the payment of the interest quarterly (of the New York loans) in the city of New York.

I am very respectfully,

Your obedient servant,

A. H. LAURENCE.

Copy of a letter from Gen. Jos. G. Swift, of the city of New York.

NEW YORK, 14th, Nov. 1823.

SIR—I have received your letter of 11th inst. inquiring, whether in my opinion a loan of two and a half millions of dollars could be effected in this city, for the purpose of constructing a canal between the Ohio river and Lake Erie through the state of Ohio. Upon this subject I have made some inquiry, which, with my own reflections, induce me to believe that the loan might easily be effected, if a Legislative engagement were made on the part of the state of Ohio, to pledge a very small tax upon the land of that state, together with the income of the canal, as surety to discharge the annual interest of six per cent. on the loan, and also to discharge the loan itself by moderate annual instalments after the expiration of say twenty to thirty years. In my opinion the loan which you contemplate, or even one of three millions could, under the preliminaries which I have mentioned, be effected in this city by taking up, say half a million annually.

This opinion is, I think, justified by the simple facts, that the loan for the New York canal was effected with ease, and that the canal you contemplate may be considered as a continuation of the great canal. To this view we may superadd, as a farther reason in favor of effecting the loan, the known value of the soil and products of Ohio, and also the important fact, that the state of Ohio is clear of debt—this last I hear by report, I have no doubt of its truth.

With hearty good wishes for the prosperous advancement of internal improvements in the great and growing state of Ohio, I remain,
Yours very respectfully,

J. G. SWIFT.

MICAJAH T. WILLIAMS Esq.

Copy of a letter from William Bayard, Esq. of the city of New York.

NEW YORK, Nov. 15, 1823.

MICAJAH T. WILLIAMS, Esq.

SIR—I duly received your favor of the 10th inst. proposing some queries to me in relation to the contemplated canal between Lake Erie and the Ohio river, and do assure you that you have my warmest wishes for the early completion of so magnificent a work, which is intimately connected with the Great Western canal of the state of New York. As to the practicability of the Ohio canal, I am not a competent judge. From the face of the country between Lake Erie and the Ohio river, I should incline to the conviction, that more than one route could be found for a suitable channel for internal trade. surveys by men of science are, however, the best, and only satisfactory test on this point. As to the expediency of such a canal, it is too obvious to demand much illustration. It would open a direct, active and profitable trade between the Atlantic and the western states. It will bring the great and fertile valley of the Mississippi nearer to the Ocean. It will enable Ohio and the other western states, to open a trade with the city of New York; receive supplies of merchandize by water instead of land carriage; to send their flour, hemp, tobacco and other agricultural products to the greatest and surest market on the western continent; it will in fact give a new spring to agriculture, domestic manufactures, and the useful arts in the interior; and add new life and vigor to our foreign commerce. And above all it will be one of the grand ties to aid in preserving the American Union, so strongly spoken of by the Father of our country, Gen. Washington, in his farewell address.

As to the financial resources requisite for the union of the Lakes and the Ohio river, I cannot cherish any well grounded apprehensions. I am informed that the state of Ohio has great resources, an extensive and fertile territory, and has now a population exceeding seven hundred thousand souls—intelligent, enterprising and industrious people who in twenty years will more than double their present number. Your pursuits being to a very great extent agricultural, are therefore safe and exempt from great hazards and losses; the habits too of the people of Ohio are moral, and the patriotism of your state unsullied; under these circumstances, the question arises—Should the state of Ohio come forward and pledge her faith and her resources, could she raise money in the market, on a long credit, to commence and carry on her great and splendid work of internal improvement? I think she can. With the prompt payment of the interest on the debt to be contracted, payable quarterly, as is adopted by the state of New York, which no doubt the state of Ohio is competent to; there can, I think, scarcely be a doubt but that the requisite funds can be obtained for this object, and even if not in the United States, in Europe, where the excess of capital is so great. With the great security the state of Ohio could give for payment of principal as well as interest, I am really inclined to believe that the foreign capitalists, would with avidity adventure in a loan of this nature, in preference to many of the foreign loans opened in Europe. Presuming, beside the responsibility of the state, the canal would also, or its revenue, be appropriated in part to the payment of the interest. I cannot, as I before remarked, cherish any well grounded scruples as to the ability of Ohio to contract such

Scient loans for the accomplishment of her contemplated canal, should the state offer to mortgage it for thirty or more years, even to individuals forming a company; this, however, is merely my opinion. I know that in London, New Orleans corporation stock has been sold at a premium; but upon what basis it is secured I know not. Certainly it cannot be more firm than the state of Ohio can offer—and I think abroad her stocks would command public confidence, as well as throughout the Union. We have for our foreign friends invested largely in our state canal stock, to which a preference has been given from the long period it has to run; and which has the entire confidence of foreigners. Why then should not the great state of Ohio enjoy an equal confidence? Certainly it will. I would further add that in consequence of the remoteness of the state of Ohio from the seaboard, and from the money market, it would be advisable, in the event of that state undertaking the canal, to appoint an agent in New York, or wherever she contracts her loans, to superintend the transfer of her stocks, payments of interests, &c. as is now done for this state's loan, through one of our banks.

Assuring you of my respect, &c.

WM. BAYARD.

Extract of a letter from H. Post, jun. Esq. Cashier of the Franklin Bank of New York, dated,

NEW YORK, Nov. 15th, 1823.

"SIR—Your letter of the 8th inst. I have received, inquiring of me whether in my judgment, a loan of two millions and a half of dollars could be effected in this section of the Union two years hence, on the credit of the state of Ohio, for the purpose of making a canal connecting the waters of Lake Erie with those of the Ohio river, the interest to be paid semi annually, at six per cent. On carefully reflecting on all the circumstances which have bearing on the subject, I am of the belief that such a loan can be effected, at the time specified; upon the hypothesis that the nation then shall be in a state of tranquility, and that the interest be paid at this place."

Copy of a letter from Lynde Catlin, Esq. President of the Merchants' Bank of New York.

NEW YORK, Nov. 17th 1823.

M. T. WILLIAMS, Esq.

DEAR SIR—In reply to your note of the 15th instant, inquiring whether the state of Ohio may probably obtain loans, two years hence, to the amount of \$2,500,000, at an interest of six per cent. reimbursable at a distant period, for the purpose of connecting, by a canal, the waters of Lake Erie with the river Ohio, on a pledge of the faith and revenues of the state and particularly of the canal, I beg leave to say, that, in my opinion the population, resources and rapidly increasing wealth of the state justify the fairest expectation that loans, to that amount may be obtained, for an object so interesting and beneficial to the public, provided no political occurrence should disturb the present state of the money market.

I will further add, as favorable to the prospect, that foreign capitalists have of late since the canal stock of the state of New York has been in the market, become acquainted with the credit of individual states, and appear to repose a confidence therein, not much inferior to that reposed in the United States. I have no doubt they will become subscribers.

I am, most respectfully,

Your servant,

LYNDE CATLIN.

Copy of a letter from John T. Champlin, Esq. President of the Farmers' Fire Insurance and Loan Company, New York.

NEW YORK, Nov. 17, 1823.

MICAJAH T. WILLIAMS, ESQ.

SIR—I have the honor of acknowledging the receipt of your much respected communication of the 15th inst. and with much pleasure give you my opinion as to the queries you put to me, as to the probability of obtaining in this city, money on loan on stock created by your state, bearing an interest at six per cent. per annum, payable semi annually, to the amount of \$2,500,000, in order to prosecute the project of your contemplated canal.

In giving my opinion on this subject, I must be permitted to premise, that the opinion I give is founded on the belief that there will not be any considerable change in our money market, from the present state of it. Supposing this to be the fact, I have no hesitation in saying that there will be no difficulty in obtaining these loans, as they may be required for the object, provided satisfactory laws are passed, and arrangements made to pay the interest in this city, as well as the principal. This is indispensable, for although large capitalists take in the first instance such loans by contract, yet they are afterwards divided and subdivided into small sums the interest of which the holders depend on for their support; the aggregate amount held in this way in all public stocks is almost incredible. For this reason I would by all means recommend the interest to be payable quarterly as the public stocks of the United States and those of this state are. The contractors of stocks look to the London market also, for sales to great extent oftentimes. Indeed of late, the stocks in this country are a pendulum to regulate foreign bills of exchange, and are negotiated as a substitute to the latter; and therefore it is all important, that the interest should be paid here, and that quarterly; which will put them more on a par with the stocks of this state. Any deviation will tend to injure the credit of them more than any benefit that can possibly result from any other plan.

The strongest evidence to be given of the probability of obtaining the loans in question is to state to you a transaction, or correspondence I entered into with the corporation of the city of New Orleans the year before last, while I was concerned with the house of A. H. Laurence & Co. respecting a loan they wanted for improving that city. This loan they effected, say \$250,000 at seven per cent. It was taken at par, payable at ten years, interest quarterly, by an English Agent; and by letters from London received a few days since, I am informed that a part of that loan was sold on the exchange at 107 per cent. and 110 per cent. asked for a further sum.*

Should the project of your canal be carried into effect, the first loan it is not likely will be taken on so good terms as the subsequent ones will probably be; time will be required to introduce it, not only to permanent holders here but also in England; this is done only by capitalists in the first instance.

* By advices recently received from New York I am informed that this stock, which is bottomed only on the faith and credit of the corporation of the city of New Orleans, was in London, on the 5th November last, worth 9 per cent. above par. The New York canal six per cent. stock, redeemable in the year 1845, has commanded in that market 12 per cent. premium. It is stated that a large proportion of the New York loans is now held in London, at a considerable advance.

It is also stated on the authority of Mr Wilkes, the Cashier of the Bank of New York, who has recently returned from London, that the discount on commercial bills or mercantile paper in that city is only $2\frac{1}{2}$ per cent.

M. T. WILLIAMS.

January 26, 1824.

The incorporated company of which I have the honor to be president, may perhaps be made serviceable on the occasion. But at any rate, I beg you, or any of you that are the promoters of the object in question, will at all times command my services either officially or individually.

The contemplated object is, indeed, one of great national importance, and to this state and city particularly, and I most ardently pray it may be undertaken. If your state is free from debt, as I understand it is, there certainly ought not to be any hesitation whatever on the subject. The obtaining the loans only depend on your laws that may be enacted to provide for the interest, not for money taken out of the state, but for capital brought into it. The effect in our own state of capital taken out of the city, (or from England, or wherever the stock is held,) has been of incalculable advantage, so much so, that it is not thought extravagant to say, that if our canal had cost double what it has done, that it would be more than double the advantages of it. If this is so, how much more advantageous is it for your state to bring the whole of this capital into it from other states or places?

As to the expected advantages of your canal, I can form no opinion; but I have no reluctance whatever in asserting, that allowing the income of it for 30 years is only sufficient to keep it in repair, that the people of your state would be the gainers, instead of being losers by the undertaking. That is, I consider the advantage of the capital employed there, of itself sufficient. This is an opinion not altogether speculative, but is formed from the effects produced in our own state.

I regret that I have not had time to reply more particularly to your inquiries: my time has been so occupied since I received your note, that even this hasty reply has been written under incessant interruptions.

I am very respectfully, your obed't serv't,

JOHN T. CHAMPLIN.

*Office of the Farmers' Fire Insurance
and Loan Company.*

NOTE VI.

The manufacture of salt by means of solar evaporation, has been commenced on a very extensive scale at Syracuse, where the Salina side cut joins the Erie canal. Two companies of capitalists have commenced the manufacture of salt on this principle, and have during the past season satisfactorily tested its practical utility. They are progressing in the construction of extensive works for this purpose; have at this time about twenty-five acres of ground covered with vats, and will progress until they cover sixty acres each, which will probably be done in the course of the ensuing season.

The salt manufactured on this principle, is found to be of a quality very superior to that made in the ordinary way; it is of a quality equal to the coarse or alum salt which is imported.

Judge Foreman, the projector and superintendent of these works, is of opinion that salt can be manufactured by this method at eight cents per bushel, which with the duty of twelve cents per bushel, payable to the state, will make its cost at the works only twenty cents. The present price is twenty-five cents per bushel.

This salt, it is believed, can be transported in bulk, by means of the Erie canal to Buffalo for five cents per bushel, and across Lake Erie for the same sum, making its cost on the shores of the Lake only thirty cents per bushel.

The extensive works now progressing, will when completed, supply any quantity of coarse heavy salt which the demand can call for.

NOTE VII.

Statement of Canals in England, with the original cost of the stock of each, its present price and yearly dividend

<i>Names of Canals.</i>	<i>Original cost of each share.</i>	<i>Present price of each share</i>	<i>Annual dividend on each share.</i>
Birmingham,	£ 25	565	20
Chesterfield,	100	120	8
Coventry,	100	999	44
Erwark.	100	1000	58
Grand Junction,	100	218	9
Leeds and Liverpool,	100	278	10
Lieicester,	100	260	10
Oxford,	100	640	32
Stafford and Worcester,	100	642	40
Trent and Mercer,	200	900	75
Warwick and Birmingham,	100	210	11
Warwick and Napton,	100	235	10
Loughborough,	100	2400	119
Milton and Mowbray,	100	170	8 $\frac{1}{4}$
Mersey and Irwell,	100	650	30
	1525	9287	485 $\frac{1}{2}$

From the above it appears that canal stocks in England of the medium original cost of 1525 £, pay a medium dividend of 485 £; exceeding 31 $\frac{1}{2}$ per cent. per annum; and are now worth 9287 £; more than six times their original cost.

AN ACT

In addition to the act authorizing an examination into the practicability of connecting Lake Erie with the Ohio river, by a canal.

Sec. 1: *Be it enacted by the General Assembly of the state of Ohio, That the board of commissioners constituted by the act aforesaid, and the act supplementary thereto, are hereby authorized and directed, to continue their labors in making the surveys, locations, examinations and estimates directed by the aforesaid acts, and also of the Muskingum and Scioto route not yet completed: And the said commissioners are hereby directed to make a further and full examination as to the practicability of making a canal on the middle or Sandusky and Scioto route, and also the practicability and feasibility of connecting the Tymochtee and St. Mary's summits with the Mad river by a lateral or branch canal and an estimate of the quantity of water necessary to supply the Tymochtee summit, in case moveable locks and inclined planes were adopted thereon.*

Sec. 2. *That the commissioners aforesaid, are further directed to examine or cause to be examined, the several harbors on Lake Erie, where the proposed canal may probably terminate, and in the estimate of the expence or probable costs of a canal on each route, that they include the expence of erecting all artificial works necessary for the formation or protection of such harbor: And the board of commissioners are hereby authorized to allow such further additional compensation to the acting commissioners, over and above two dollars per day, as in their opinion the nature of the service and the justice of the case may require: Provided, The same shall not exceed in the whole three dollars per day.*

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY, BY JOHN KILBOURN, AT \$3 A YEAR, IN ADVANCE.

VOL. I.

COLUMBUS, OHIO, SATURDAY, AUG. 2, 1828.

NO. 7.

Readers will notice that the Canal Documents are continued on the third page of every number, from the last page of the preceding number.

The following description of the Hudson and Erie Canal is copied from the last edition of Spafford's New York Gazetteer. It will probably be an interesting article to many of our readers.

Erie Canal.—It commences at Buffalo, on Lake Erie, near the mouth of Buffalo Creek, and terminates in a capacious Basin, at Albany, its whole length being 363 miles. It is 40 feet wide on the surface, 28 feet on the bottom, having every where 4 feet depth of water; and it has a tow-path, for the horses that draw the boats, 10 feet wide, raised 2 to 5 feet above the surface of the water, and is fenced, where necessary, and bridged, at the expense of the State. The public land, along the Canal, is generally 60 to 70 feet in width; in some places more is required, and of course purchased for the State. Let us trace its ground plan, commencing at Lake Erie, the greatest elevation of its line, marking its levels, Locks, descents and ascents, aqueducts, distance, &c. From the mouth of Buffalo Creek, it lies close along the Lake shore to Black Rock, and thence along the bank of Niagara River to the mouth of Tonawanda Creek, 10 miles from Buffalo, with a descent of a half inch in each mile: at the mouth of this creek is a dam of 4 feet 6 inches, and the Canal enters the pond formed by this dam:—this creek had a descent of only 1 foot in 12 miles, and the Canal follows the Creek, or rather the Creek forms the Canal these 12 miles, having a tow-path formed along its bank: at the end of this distance, leaving the Creek, a deep cut commences, which extends 7½ miles, in a N. Easterly direction, across what is called the *Mountain Ridge*, with about 3 miles of rock, averaging 20 feet in depth, and a descent of a half inch in each mile, to the brow of the mountain: at this place, Lockport, it descends 60 feet, by 5 double, combined Locks, of 12 feet descent each; and from the last of these takes an easterly direction, about 1 to 3 miles S. of the *Albion Way*, or *Ridge Road*; with a descent of a half inch in each mile to the *Genesee River*, at Rochester,—63 miles;—in this distance it passes over several aqueducts and deep ravines, and arriving at the Genesee, crosses over that river in a stone Aqueduct of 9 arches, each of 50 feet span, and 2 other arches and aqueducts of 40 feet each, 1 on each side of the river, over the Mill canals; after passing the river, turning a little to the south, it receives a navigable Feeder, or branch Canal, from the river above the Rapids and Falls, 2 miles in length, and

turns eastward, 2 miles, to a Lock of 7.4 feet descent: thence level ½ of a mile, to a Lock of 7.4 feet descent: thence level ¼ mile, to a Lock of 7.4 feet descent: thence level ¼ mile to a Lock of 7.4 feet descent: thence level 1.2 mile, to a Lock of 7½ feet descent: thence level 3½ miles, to a Lock of 8 feet descent, passing by *Pittsford*: thence level 1 mile, over the high embankment at Irondequot, [see *TEORONTO*,] and passing on the same level 14 miles, to a lock of 10 feet descent, in the W. part of *Palmyra*: thence level ¼ of a mile to a lock, descent 10 feet: thence 12 miles, passing an aqueduct over Mud Creek, above the Village of *Palmyra*, and passing the Village, to 3 Locks, of 8 feet descent each: thence level, 6 miles, to *Mud Creek*, above the Village of Lyons, a Lock of 10 feet descent, and a large stone aqueduct of 3 arches, over Mud Creek, of 30 feet span, each: thence level 1 mile, to the *Village of Lyons*, and a Lock of 6 feet descent: thence level 4 miles, to a Lock of 7 feet descent: thence level 4 miles to the *Village of Clyde*, and a Lock of 5 feet descent: thence level 5 miles, to the western edge of the great *Cayuga Marshes*, and a Lock of 9 feet descent, to the level of the water of *Seneca River*: thence level through the Canal as formed in the Marshes, and through the water of the river, 6 1-2 miles, to *Montezuma*, on the E side of the Seneca River, and Lock of 7 feet ascent, the first from Lake Erie: thence level 1 1-2 miles, and a Lock of 9 feet ascent: thence level 4 miles to *Buckville*, and a Lock of 9 feet ascent, with an aqueduct over *Owasco Creek*, of 4 arches, 20 feet each: thence level to *Jordan*, a Lock of 11 feet ascent, and a stone aqueduct, of 3 arches, over *Skaneateles* outlet: thence level 12 miles, to a Lock of 11 feet descent, and a stone aqueduct of 2 arches, 30 feet, each, over *Otisco Creek*: thence level 7 miles, passing by *Geddes V.*, to a Lock of 6 feet descent: thence level, passing by *Syracuse*, and over *Onondaga Creek*, by a stone aqueduct of 4 arches, 30 feet span each, 1½ mile to a Lock of 6 feet ascent: thence 1 mile, level, to 2 Locks of 10 feet each, ascent: Here commences the Long Level, 69 1-2 miles, passing through the towns of *Salina*, in which it commences, *Manlius*, *Sullivan*, *Lenox*, *Verona*, *Rome*, *Whitestown*, *Utica*, and into *Frankfort*, in *Herkimer Co.*, where it terminates, near Myers's Creek, by a Lock of 8 feet descent:—on this long level, it passes over the *Butternut*, *Limestone*, *Chittenango*, *Canasaraga*, *Oneida*, *Wood*, *Oriskany*, and *Sagaquada* Creeks, by aqueducts of various extent, having, in its course, crossed Madison and Oneida Counties, and parts of Onondaga and Herkimer: From the last mentioned Lock, in Frankfort, thence level 1 mile to a Lock of 8 feet descent: thence level 1-2 mile, to a Lock of 8

feet descent: thence level 2 1-2 miles to a Lock of 8 feet descent, after passing an aqueduct of 200 feet in length: thence level 1-4 mile, to a Lock of 8 feet descent: thence level 1 1-2 mile to a Lock of 9 feet descent, into a part of the old Canal, at *German Flats*: thence following that Canal 1-3 mile, leaving it, and continuing the level 3 miles, to a Lock of 8 feet descent: thence level 3 miles, to the head of the *Little Falls* where are 5 Locks, each of 8 feet descent, in the distance of 1 mile: here is an aqueduct over the Mohawk, of 3 arches, 1 of 70 and 2 of 50 feet each, connecting the Old with the Erie Canal: thence level, 5 miles, to a Lock of 8 feet descent, in *Danube*: thence level 4 miles to a Lock of 8 feet descent: thence level 3 3-4 miles to a Lock of 8 feet descent: thence level 4 3-4 miles, to a Lock of 7 feet descent, near *Otsuaga Creek*: thence level 3 1-4 miles to *Canojoharie Village*, and a Lock of 6 feet descent: thence level 12 miles to a Lock of 7 feet descent, in *Charleston*: thence level 4 1-2 miles to the bank of *Schoharie Creek*, and a Lock of 6 feet descent: thence across the Creek through a pond formed by a dam and a guard Lock, 3-4 mile, to a Lock of 4 feet descent, in *Florida*: thence level 3 miles to a Lock of 8 feet descent: thence level 5 1-4 miles to 2 Locks, each of 8 feet descent, with a small pond between them: thence level 6 miles to a Lock of 8 feet descent: thence level 3 miles to a Lock of 8 feet descent: thence level 1 mile to a Lock of 8 feet descent, in *Rotterdam*: thence 3 miles level to the City of *Schneclady*, and continuing the same level 4 miles below the City, through *Niskayuna*, to an Aqueduct over the Mohawk River, 748 feet in length, between the abutments, supported by 16 piers, 25 feet above the river, and immediately after passing the aqueduct there are 3 Locks, each of 7 feet descent, in *Halfmoon*, a few rods below *Alexander's Mills*, and the Bridge: thence level 2 miles to a Lock of 7 feet descent: thence level 1 1-2 mile to a Lock of 7 feet descent: thence level 3 1-2 miles to a Lock of 7 feet descent: thence level 5 miles, passing over the Mohawk River by an Aqueduct of 1188 feet in length, between the abutment, resting on 26 piers: thence about 3 miles to 4 Locks, of 8 feet descent, each, in *Waterliet*: thence level 1 1-4 mile to a little below the *Cahoon Falls*, to 2 Locks, of 9 feet descent, each: thence 1-4 mile level to 3 Locks, and a descent of 26 feet: thence level 1-2 mile, to 7 Locks, of 8 feet descent, each: Here a Feeder comes in from the Mohawk, and connects the Erie with the *Champlain Canal*, and there are 2 Locks, of 11 feet descent, each: thence level 7 miles to a Lock of 11 feet descent: thence level, 1 1-2 mile to a point in the rear of the old State Arsenal, where there is a small Basin, and a Lock of 11 feet descent, to the tide waters of the Hudson, and into the great Basin, in the City of Albany. The Locks are 90 feet long between the gates, 15 feet wide, built of the most durable stone, well cut and coursed, and laid in water-time. The courses are not less than 3 inches face, very few less than 12, and from that to 30 inches.

There are several Side-Cuts, or Lateral Canals, as one in *Waterliet*, opposite Troy,

where a branch connects with the River, by 2 Locks, of 11 feet descent, each: a Side-Cut from Syracuse, of 1 1-2 mile, to Salina, and capacious Basins at each end: the one opposite Rochester, of 2 miles in length, a navigable Feeder, is noticed above, by which boats from the Canal may ascend the Genesee River 70 to 80 miles above Rochester.

Catskill and Ithica Rail Road.—The *Ithica Journal* states, that a Convention of Delegates from the several towns interested in the construction of the Rail-way from Catskill to Ithica, will be held in the village of Unadilla, on Wednesday the 16th of July inst. for the purpose of consulting upon the most effectual means of promoting the great object, and to adopt measures preparatory to a survey of the route by the Engineer, which survey will be commenced about the 1st of August.

N. Y. Enquirer.

Welland Canal.—This great undertaking is now likely to be carried on with increased vigor. Mr Merritt has been very active in procuring subscriptions to carry it on. He has been very fortunate in his endeavours to procure aid, so much so, that he has already authorised the President of the Company to draw for £20,000. Ministers look upon the undertaking with a favorable eye, and to render its advancement more sure, and its completion more speedy, they have recommended a loan of £50,000 for the purpose. Ib.

We have lately received a letter from Wm. Hamilton the actuary, (agent) of the Franklin Institute, at Philadelphia, announcing that they have assumed the proprietorship, and publication of "THE FRANKLIN JOURNAL, AND AMERICAN MECHANIC'S MAGAZINE; devoted to the useful Arts, Internal Improvements and general Science."

It is published in monthly numbers of 72 pages each, at five dollars a year, in advance.

In this letter, Mr Hamilton says, he believes "it to be a work highly conducive to the interest of mechanics, and scientific persons generally."

The editor of this paper will act as agent, and receive subscriptions and forward all monies, which may be required, for said work.

Just as this paper was going to press, the editor received a literary circular from Mr Edward Wilmer, bookseller at Liverpool, Eng containing a list of the English, Scotch, and Irish publications: which may be examined at this office, by any person wishing to send for any foreign paper; or having a curiosity of seeing a list of British periodical publications.

From this letter, we learn that there are fifteen daily papers published in London alone—four three times a week—seven twice a week,—and forty-two weekly:—in all sixty-eight: beside quarterly and monthly publications.

Yet, in proportion to the population, this is not supposed to be so great a number as those published in New York city.

Sec. 3. That the said commissioners are hereby directed to employ an engineer of experience in canalling, to superintend the examinations, surveys and estimates herein or heretofore directed; and they are directed to make report of their proceedings, under this and the acts to which this is in addition, together with the report of the engineer by them employed, to the next General Assembly, on or before the fifteenth day of the next session.

Sec. 4. That the sum of six thousand dollars, be, and the same is hereby appropriated for the purpose of carrying into effect the provisions of this and the before mentioned acts, to be paid out of any moneys in the treasury, not otherwise appropriated, on the order of the commissioners.

JOSEPH RICHARDSON,

Speaker of the House of Representatives.

ALLEN TRIMBLE,

Speaker of the Senate.

February 23, 1824.

On the 25th of February, 1824, NATHANIEL BEASLEY was appointed a canal commissioner, by a concurrent resolution of both branches of the Legislature.

Extract from Governor Morrow's Message, of the 7th December, 1824.

The examinations authorized by the Legislature for ascertaining the practicability of a route for a navigable canal from Lake Erie to the Ohio river, which for several seasons past have been prosecuted with a zeal and industry corresponding to the importance of the object in view, and at an expence of much labor, attended with serious privations to those employed in the work, have at length been brought to a favorable termination. The reports of the commissioners are in the progress of preparation, so that this project of improvement, and the subjects connected with it, will no doubt receive the serious attention of the General Assembly at their present session.

The subjects which will claim the principal share of your attention at the present session, undoubtedly will be the project of the contemplated canal from Lake Erie to the Ohio river, and in connection with it the revenue system and general fiscal concerns of the state. It might be supposed that the executive had failed in his duty, were he not to present to the General Assembly particular views and considerations in respect to this interesting subject.

It will be proper to remark that the necessary information to enable the Legislature to act on the subject must be furnished by the board of canal commissioners.

By the provisions of the law constituting the board, and which defines their powers and prescribes their duties, the whole subject in all its details is submitted to them; they are directed to report their proceedings in general, with the estimates of the cost of construction and comparative advantages of each of the proposed routes—and also information respecting the ways and means for carrying the intended work into effect; to the General Assembly direct. The executive cannot be supposed to be possessed, nor is he in fact possessed of any official information on the subject, hence the views and considerations that will be submitted are proposed only in the shape of general remarks. In the consideration of the subject it appears that the general utility and advantage of canal navigation and the decided preference, which on experiment it maintains for superior facility, cheapness and safety over conveyance by river navigation, or by land carriage on the best improved roads, is now universally admitted and cannot reasonably be questioned. And that a view of the situation of our interior country—to the nature and quantity of its products—and to the markets accessible alone at present for

vending these products, cannot fail to force the conviction that the proposed canal for opening a navigable communication to the Lakes and through them to the eastern cities, will afford advantages real, great and permanent. To the execution of this work nature has interposed no insuperable obstacle; the supply of water has been ascertained to be sufficient, and the ground on examination, found to be favorable. The advantages being unquestionable, and the natural practicability of the work having been satisfactorily ascertained, the subject thus far presents itself in a favorable aspect to the Legislature. Before, however, any final determination can be made, two important points, felt to be of much difficulty and delicacy will present themselves for decision. The selection and designation of a particular route, and the provisions to supply the necessary funds to carry on and complete the work. In determining the preference to a particular route the general accommodation, and economy in the cost of construction will furnish the real criterion on which to form a judgment, while the report of the commissioners embracing the opinion of the Engineers, will present the facts, and furnish the lights, to direct to a just decision.

On the opinions and judgment of the distinguished civil engineer who has been employed to review the routes on which a location had been made, much reliance should be placed. His general character and unquestionable impartiality together with his practical knowledge and skill acquired by long experience entitle his opinions to the highest confidence. It is perhaps unnecessary further to remark that with all the information and lights that the reports and examinations on the routes will afford, unless in the investigation, general interests and policy be kept in view, and be held superior to particular local interests no favorable result can be produced—while improvements, such as those contemplated, may benefit all, yet in no instance will they afford equal benefits to all; hence, there must, in every case, be a concession of particular and sectional interests for the general accommodation.

The consideration of provision for the necessary funds to effect the contemplated improvement, not only appears to be essentially connected with the subject, but to be in its nature antecedent to every other, relating to that object. For however beneficial the improvement may be when completed, and to whatever degree of certainty its practicability with the application of the proper means may be reduced, still unless a fund real and adequate to the object be provided, it cannot be carried into effect. From an investigation into the resources of the state, compared with an estimate of the cost of construction, a judgment can be formed of the capacity of the state to execute the work. If on such investigation and comparison, means shall be found sufficient, the work may be authorized, and proceeded in with safety. It is not supposed to be necessary that the state from its revenues, should immediately supply the principal, to be expended—for this—reliance must be had on loans to be effected on a credit, sufficiently extended, to place the redemption beyond the period of the completion of the work. To effect loans provision must be made for the punctual discharge of the accruing interest. That loans may be procured on favorable terms, the fund for the discharge of the interest must be certain, and to preserve the public faith inviolate, it must be sufficient. The revenue must be ample and certain, in order to establish a foundation for credit, so that the necessary loans may be obtained on advantageous terms. In making the calculation of the annual amount of the revenue, which will be required to discharge the interest on the necessary loans, and also the ordinary expences of Government it may be assumed as correct, that when any considerable section of the canal is completed, and sufficiently extensive to be used for the purpose of transportation, it will be productive to the revenue, and release the treasury to the amount of

the receipts in tolls, from a charge on the subsequent loans. Without accurate estimates of the work, on the whole line of canal, or the cost of any particular section of it, which might be calculated to be of itself productive to the revenue, no calculation of the amount of revenue can be hazarded. But, however, on any estimate which the imperfect information I possess, will enable me to form, claiming for it no more than an approximation to the true result—the revenue of the state—produced from the present rate of taxation, when a part is appropriated to county purposes, and to the improvement of county roads—will be insufficient for the support of Government and for the discharge of the interest, on the necessary loans for the contemplated work.

It appears by a report from the Auditor of state to this office, that the balance in the treasury exceeds sixty thousand dollars, this balance is an aggregate of the surplus revenue of several years. The annual surplus of the year past would not exceed fifteen thousand dollars, and with the present rate of taxation, the annual surplus of revenue cannot be estimated, much to exceed the same amount in succeeding years. For notwithstanding the revenue will increase from new lands, becoming the object of taxation, the expenditure of the government, from an accession of population, and the extension of the settlements will increase nearly in the same proportion. The surplus revenue, on the most favorable estimate, is a fund in amount much below what is required to effect the object in view. It would be hazardous and improvident, to engage in an enterprise, requiring an expenditure of several millions, and a period of years for its execution, with an insufficient provision for the funds. A ruinous failure in the undertaking might ensue, after large expenditures had been incurred, and in case of eventual success the burden of debt would be exceedingly increased. To depend on loans for the discharge of interest, is a policy, that no prudent Government will resort to. The prospect of a progressive accumulation of debt, and the effect of a profuse policy to sink the public credit, will deter the most adventurous from the attempt. It would then appear from any calculation of the amount of anticipated expenditure—a view to the state of the treasury, and to the approved principles of fiscal policy, that ought to be pursued, that provision to replenish the treasury is indispensable, and it rests with the Legislature alone to authorize a grant for the necessary supplies. No question is entertained of the capacity of the state with suitable exertion, to furnish the adequate means, and that without the imposition of burthens oppressive to the people. It is believed that an annual tax much less than what was paid by the people of this state, in direct tax alone, for the support of the last war, would be sufficient, and which to the honor of their patriotism, was paid without a murmur. It is admitted the call then was more imperative, and the means more abundant than at present. National rights essential to its independence, were to be defended, and the means for contribution were furnished by the expenditure of the war. But in the present instance too, there are interests of high merit involved. Interests which although of the peaceful kind warrant a call for contribution, on the part of the people, to carry into effect the object. The means of supply to constitute a fund, for the discharge of interest on the necessary loans, will be retrenchment in the ordinary expenditure, increase of the present taxes, and a resort to new objects of taxation. The products to the fund from the savings by retrenchments, cannot be much calculated on. Without injury to the public service, they will be too inconsiderable to produce much effect. The principal reliance must be placed on an increase of the revenue. It is therefore respectfully submitted, the propriety of providing for an increase of the tax on the several rates of land, at least, to the same amount that was charged immediately prior to the last session of the General Assembly, and that the whole

products of the land tax, be made payable to the state treasury for state purposes.

That a tax be imposed as follows—on judicial process in civil cases—on capital employed in trade—on pleasure and travel carriages—on brass and othes clocks, and on gold and silver watches—and that the product on such taxes in whole, or in part, shall be made payable to the county treasury of the respective counties wherein the tax is levied. That all moneys which have accrued and are unexpended, and moneys that may accure to the three per cent. fund, for roads, be (with the consent of Congress) appropriated exclusively in aid of a canal fund; and that the sections of land (unsold) in the reservation, at the Scioto Salt Works, be (with the consent of Congress) disposed of in fee simple, and the proceeds of sale appropriated to the same fund.

From this proposed increase of the revenue it is presumed that after the charge of the ordinary expences of government, funds will remain to discharge the interest on such loans as will be required for the construction of such section of the canal as would in itself be used, and the products arising thence, be brought in aid of the fund. This assumption is made, however, on the ground, that the cost will not exceed the common conjectural estimate, and that proper economy shall be observed in the expenditure of moneys by the government. It is proposed, further, for the management of the fiscal concerns relating to the operation on the proposed canal, that a board of commissioners be constituted, in whom shall be vested, in trust, all moneys appropriated for the object, and also the proceeds from the canal, when in part made; and when wholly completed, until all the debt contracted for its construction shall be paid; and that they shall have power to contract for the necessary loans and pay the debts on order of the canal commissioners.



Extract from the Journal of the House of Representatives, of the 5th of January, 1825.

“Mr Bigger presented for the consideration of the House, a memorial to Congress accompanied with resolutions, on the subject of the contemplated canals; which was read as follows:

To the Senate and House of Representatives, of the United States, the memorial of the Legislature of the state of Ohio, respectfully represents:

“That the commissioners appointed by the Legislature, to make certain specific examinations with respect to the practicability of connecting Lake Erie with the Ohio river, by means of canal navigation, have completed the duties assigned them. They have located two lines of canal, the one commencing at the mouth of the Scioto river, and terminating on Lake Erie, either at the confluence of the Cuyahoga or Black river, as may be found the most eligible. The other line of canal, commencing at the city of Cincinnati, and terminating at the foot of the Rapids of the Miami of the Lake. It is deemed unnecessary, in presenting this interesting subject to the notice of the national councils, to dwell with particular precision on the advantages resulting from its accomplishment. A few observations, however, on this subject may not be considered unimportant. In reference to the lines of canals located by the canal commissioners of this state, considerations present themselves of an extraordinary character. In a local point of view, the subject presents advantages truly important. But viewed in the character in which it must deservedly stand in point of national interest, its advantages will be incalculable. It will open a speedy, cheap and safe internal communication from Orleans to the Hudson, and to the interior of our north-western Lakes. The various commodities and productions peculiar to the

northern and southern extremities of the Union, will be profitably exchanged. It will materially enhance the value and facilitate the sales of such of the public lands as are near to either of the located routes. In the event of war, its advantages in a national point of view, will be greater than can well be estimated. In short, the citizens of this vast republic, from the 29th to the 47th degree of latitude, will, through this channel of communication, be continually holding intercourse with each other for the purposes of trade. A traffic founded on the principles of reciprocal advantages. Not governed by the provisions of a treaty liable to be changed, or perhaps partial in its provisions: but by the permanent provisions of our constitution, which secures to all, the same privileges in trade. Thus will the citizens of our Union be benefitted, our manners become assimilated, and in every sense of the word, will it serve as a ligament to bind more closely, our political Union.

"The practicability and utility of an undertaking of this kind, in the United States, have been now too well tested by experience, to need confirmatory arguments in its favor. Without noticing particularly such canals as are now in full operation in the United States—the almost entire completion of the New York canal, considered either in reference to the astonishing magnitude of the undertaking—the shortness of time in which it will be accomplished—its eminent advantages, and the amount of toll, which it already produces, stands as a monument to the world, of what energy and enterprise may accomplish in works of this kind, and what are the benefits derivable from them when completed.

In speaking of the funds for the accomplishment of the splendid undertaking about to be commenced in Ohio, suffice it to say, that the almost entire reliance of the state, for raising the revenue, to meet the expences of government, has been by a tax on property. This must still continue to be our main reliance for meeting the current expences; and likewise the source from which a revenue will be raised, to discharge the amount of interest on loans procured for the completion of our canal project. Our remote situation from foreign market—the low price of almost every article of produce, and the consequent scarcity of money, are points which have been well considered. They present difficulties, but not such as are insurmountable. A vigorous effort will carry us through. Relying on the enterprise, industry, liberality and perseverance of our citizens, we harbor not a doubt, but that we shall be able to raise a revenue, sufficient to meet with punctuality the interest on whatever loans may be necessary for the completion of the work.

"The Legislature of Ohio have deemed it nothing more than proper, in presenting this important subject to the consideration of Congress, to mention its practicability, its local and national importance together with the prospects of its accomplishment, being satisfied that the representatives of this extensive republic, will feel an interest in the prospects and prosperity of every portion of the Union, and likewise under a full conviction that Congress will feel disposed to grant to the young, but enterprising state of Ohio, every pecuniary assistance which can be rendered consistent with the general good, would pray your honorable body, to grant to the state of Ohio, a donation of land, in the vicinity of either of the lines of canal, where public lands remain unsold, to such extent as the fiscal concerns of the Union will justify, the avails to be applied to canal purposes; and your memorialists as in duty bound, &c.

"*Resolved*, That our Senators and Representatives in Congress, be requested to use their utmost endeavors to procure the passage of a law, granting to the state of Ohio, a donation in land agreeably to the prayer of the above memorial.

"*Resolved*, That his Excellency the Governor of this state, be requested to forward to each of our Senators, and Representatives in Congress, a copy.

of the foregoing memorial and resolution, with a request that the subject be presented to the National Legislature.

"Ordered, That said memorial lie on the table, and that the usual number of copies be printed."

It does not appear that this project of a memorial was ever again called up.

THIRD ANNUAL REPORT OF THE CANAL COMMISSIONERS.

8th January, 1825.

TO THE GENERAL ASSEMBLY OF THE STATE OF OHIO,

IN obedience to the act of the last General Assembly in addition to the several acts relating to a navigable communication between Lake Erie and the Ohio river, we lay before your honorable body, the following statement of the proceedings had under that and the acts to which that is in addition.

To enable the board to complete, in one season, the location of two entire lines across the state as was required by the last General Assembly. it was deemed necessary to form two exploring and locating parties for that service. At the head of one of these parties they placed Mr Samuel Forrer, whose persevering enterprise and skill had already given him strong claims to the confidence of the board. The earliest measures were taken to obtain the services of another engineer, whose experience and activity should qualify him to take charge of the second party. After some delay, they succeeded in obtaining for that station Mr William H. Price, of New York, a gentleman of considerable experience in the construction of canals, who came highly recommended from that state. Since he has been in our service, he has given satisfactory evidence of his skill and experience in the line of his profession, and of his future usefulness to the state, should the construction of her proposed canals be undertaken.

They also made application to the board of canal commissioners of the state of New York, as directed by the act of Assembly, for one of their most experienced and approved engineers, for the purpose, during the latter part of the season, of revising the work and aiding in making the different plans and estimates of the cost of constructing a canal on the lines located; and also for the purpose of revising the question of supplying the Tymochtee summit with water. This application resulted in the employment of David S. Bates, Esq. one of the principal engineers of the New York canal, who has been engaged in the construction of that work from its commencement. Judge Bates arrived in this state about the first of September, since which time he has revised the whole of the lines which have been located—gauged and measured all the streams relied upon as feeders for those lines, and has fully examined the question of supplying Tymochtee summit with water. For his views and opinions on these several subjects we beg leave to refer the General Assembly to his detailed reports herewith submitted.

Muskingum and Scioto Route.

The location of a line of navigable feeder from the Scioto at Columbus, to intersect the proposed main line in the valley of Bigbelly was commenced on the 1st March. The line of this feeder, with the exception of two wash banks on the Scioto and one on Bigbelly, near the point of junction with the main line, was found to occupy ground generally favorable for its construction. These wash banks, although they present considerable difficulties which cannot be avoided, are not appalling and may be safely passed with the proposed feeder. In crossing the Bigbelly with the feeder, which is proposed to be done by means of a dam, the waters of that stream will be taken in and will prove an important accession.

On the completion of this line of feeder, the party, under the direction of Mr Forrer, was transferred to the Licking and Walnut creek summit, and the location of the line of canal, from this summit by way of the vallies of Licking and Tomaka creeks, was made to intersect near the mouth of the latter stream, the line of location made during the last season down the Killbuck valley. The line of the feeder by which the water of the North and Racoon forks of Licking must be conveyed to the summit, was also run. The construction of this feeder will present no serious difficulty. An aqueduct across the Racoon fork, by which the water of the North fork will be conveyed over that stream, is the only item of serious note in it.

The question of supplying the Licking summit and the lower levels dependent upon it, with water, is one of the most interesting and important which presents itself for consideration in relation to this route. To accomplish this object, or at least to aid in its accomplishment, it is proposed to construct a large reservoir contiguous to the summit. Nature has presented us with great facilities for doing this. About one mile northeastwardly from the highest point in the summit, commences an extensive marsh, which stretches in an eastwardly direction about eight miles—varying in breadth from a quarter of a mile to upwards of half a mile. This marsh encloses a chain of ponds, which stretch along its centre, of from fifty to three or four hundred yards in breadth. The longest of these ponds is something more than a mile in length. This marsh is surrounded with a bank of high dry land, which is generally abrupt and well defined, except on the northwestwardly side, where it approaches the South fork of Licking. The country which surrounds the marsh, on its south, east and part of its north side is high and hilly. On the northwestwardly side it is generally low, rising but a few feet above the level of the marsh. The waters of this marsh are discharged by three short out-lets from its northwestern side into the South fork of Licking, which approaches within less than half a mile. When this branch of Licking is much swollen by floods, its waters rise over its banks, and flow through a shallow ravine, which extends from the west end of the marsh to the creek some distance above. The current in the out-lets of the marsh is also inverted and the waters of Licking flow through these channels into it. By these means much of its surface is covered with water to a depth of two or three feet, and in some places deeper. When the floods of Licking subside, the water flows into it from the marsh, through the out-lets above described. To make this marsh useful as a reservoir, it is proposed to raise an embankment of sufficient height across the out lets and along the low grounds adjoining its western margin, so as to retain its waters, and those which may be thrown into it, for the use of the canal during those seasons when this aid may be required. Part of this embankment will be formed by the construction of the canal; the line of which passes along the western margin of the marsh. The bank to be formed independently of the canal line, will be about one and a half miles in length, and will average from six to ten feet in height. The earth from which this embankment is to be formed is of the best quality for that purpose, being gravel mixed with loam and clay.

The reservoir thus constructed, is to be filled with water by the streams which now discharge themselves into it from the north, east and south sides, some of which are several miles in length and are of considerable magnitude, and by the floods of Licking, which are to be taken from that stream by means of a dam thrown across it where it is sufficiently elevated, and a channel or feeder from thence to the reservoir, passing the water under the canal by a culvert, or across it by means of guard gates and banks properly constructed for that purpose. If the water in this reservoir is raised to an average height of eight feet, it will contain near seven hundred millions of

cubic feet. All this will be applicable to canal uses, except what will be lost by evaporation. It is impossible to determine precisely what the amount of this loss will be, but an estimate may be formed with sufficient accuracy for all practical purposes.

In reference to this subject it will be observed, that a considerable proportion of the area proposed to be used for this reservoir, is now covered with water; on this evaporation will not be increased by the proposed reservoir;—a larger proportion is partially covered with water and considerable evaporation now takes place from its surface. Notwithstanding this loss, a constant stream is discharged from this marsh into the Licking, of about fifty cubic feet per minute, in dry seasons. It may therefore be safe to calculate that one half the amount of loss by evaporation, will be replaced by the sources of supply now existing in the marsh, and its immediate vicinity; and that its surface will only be reduced two feet by this expenditure. After making this deduction there will remain 520 millions cubic feet of water for the use of the canal; equal to three thousand cubic feet per minute, during 120 days of the dry season.

This reservoir may be filled to the depth above proposed in twenty days, by the streams which naturally flow into it, and by the water which may be drawn from the South fork of Licking, when it is high, without calculating on the rains and snows which will fall on its surface. And its waters may be replenished by every flood which occurs during the season. These facts have been satisfactorily tested by an actual measurement and estimate on the quantity of water discharged by the South fork of Licking at the time of floods which occurred during the last season.

In addition to the quantity of water which may be drawn from this reservoir for the supply of the Licking summit, about 250 cubic feet per minute may be drawn from the South fork of Licking and its tributaries which cross the line of canal, and thrown into the summit level without feeders of any considerable length. The Racoon fork at a point where it passes about 800 cubic feet per minute, may be made tributary to the summit pound, by a feeder of about five miles; and the North fork, where it will yield 850 cubic feet, by an additional feeder of 3 miles in length. The never failing waters of Owl creek, equal to 1800 cubic feet per minute, in the driest seasons, may also be commanded for the use of this summit, by an artificial cut of nine miles, should a resort to this stream be ever found necessary.

Bloody run swamp containing near 1000 acres which is situated about two miles from the summit in a northwestwardly direction, may be converted into a reservoir by raising an embankment of about half a mile in length along its northeastwardly margin. This swamp is elevated eighteen feet above the summit level of the canal, and if converted into a reservoir may be filled by the floods of the South fork of Licking, which passes near its northern side, and is separated from the swamp by a narrow ridge.

The summit level and the levels dependent on it principally for their supply of water, are together, less than 31 miles in length.

On the plan proposed, it will be necessary to make a deep cut through the ridge which separates the waters of Licking from those of Little Walnut creek. This cut will be 32 feet deep at the highest part of the ridge, diminishing in depth as the line approaches Walnut creek, on the south, and Licking on the north, until proper cutting is obtained. The whole length of this deep cut is one mile seventy-two chains, and its average depth twenty-seven feet. This deep cut is necessary to enable us to use the reservoir first described; and important as it enables us to command the three branches of Licking at lower points, and where the streams are much larger than at the points, where they could be taken to supply a higher level. And when it is considered that for every foot which the summit is cut down two feet of

lockage is saved, and that the length and expence of feeders, as well as of the main line, will be materially diminished thereby. The expence of making this deep cut, though considerable, will not increase the whole expence of the canal as much as might at first view be apprehended. Other considerations apart, this deep cut is considered necessary to secure to this part of the canal line a constant and ample supply of water; and if this plan is adopted, no doubt is entertained of the sufficiency of this supply.

On that part of the line which extends through the deep cut, no waste of water will occur, except that which is occasioned by evaporation. That part of it which is located along the valley of Little Walnut creek, occupies ground which in formation and quality of soil is well adapted to the retention of water. As the line descends along this valley, part of the water which escapes from the canal by leakage will find its way into the stream and may, together with the natural waters of the creek, be thrown into the canal on a lower level with little expence. That part of the summit level which extends along the valley of the South fork of Licking, is generally well calculated to retain water. With this view of the subject it will probably be safe to estimate the loss of water on that part of the line which will draw its supply from the summit pound, at an average of 75 cubic feet per minute for each mile of canal, making in all 2325 cubic feet per minute—if to this amount we add for lockage water 1500 cubic feet per minute, a quantity sufficient to pass 100 boats per day, the aggregate amount of water required on this line of canal will be equal to 3825 cubic feet per minute.

To provide for this expenditure, there may be drawn from the main reservoir, per minute,	3000 cubic feet
From the South fork and its tributaries,	250
From Little Walnut to supply the lower levels along its valley, the natural stream say,	200
From Racoon fork (deducting 250 feet waste, in five miles of feeder, which will be a liberal allowance considering the small capacity of the feeder)	600
Total amount,	4050

Making altogether a supply during dry seasons of 4050 cubic feet per minute, exceeding the estimated expenditure 225 cubic feet.

It will be observed that this supply is obtained without a resort to Owl creek or even to the North fork of Licking; and when it is considered that these streams, which together will yield near two thousand cubic feet per minute after making the proper deduction for the loss which may take place in the feeders required to conduct their waters to the summit, are at command to supply any deficiency which may possibly occur in the other sources of supply relied on, no doubt can be entertained as to the practicability of supplying the Licking summit and the other levels dependent on it, with water. For a confirmation of this opinion, we would refer to the estimates and opinion of Judge Bales on this subject.

From this summit to the mouth of the Rocky fork of Licking the situation and character of the ground is very favorable for the construction of a canal. It can be with great convenience supplied with water, from the Licking and its branches. From the mouth of the Rocky fork, to the valley of the Tomaka, a distance of nine miles, the construction of the canal will be somewhat expensive. The first two miles of this section passing through the narrows of Licking presents a very romantic and rough appearance. The creek passes through a chasm in the rocks of barely sufficient width for its channel. On each side rise perpendicular ledges of rock, to the height of from fifty to one hundred feet; through this narrow pass the canal must be carried. It is, however, thought, that these two miles will not be more costly than the same

distance of ordinary line. By the construction of a dam, about nineteen feet high at the foot of the narrows, the situation for which is very favorable, and the construction of a tow-path, on the margin of the creek above, its channel may be safely and conveniently occupied by the canal; indeed this is the only possible plan of getting through this narrow pass. From the foot of the narrows to the summit between the Licking and Tomaka vallies near Irville, a distance of seven miles, about four of embankment of nine to twenty-five feet in height will be required. Its situation will be immediately at the foot of the hills through the whole distance, requiring only a single bank, from which abundant materials for its construction may readily be obtained. It must necessarily constitute a considerable item of cost, but from its situation at the foot and against the side of the hills, may be rendered very safe. At the termination of this embankment, a deep cut of one mile, averaging nine feet deep, must be encountered in passing the division ridge between these waters, after passing which, with some trifling exceptions, the line is of a favorable character to the Muskingum river.

A plan for passing the Licking into the Tomaka valley by another route, presented itself during the investigation, viz:—By ascending the run at Solomon Wood's and tunnelling through the ridge which intervenes between the Licking and Black run vallies. The summit of this ridge is seventy feet above bottom of canal; the length of the tunnel which would be required, is twenty chains. Upon this plan, about two miles in the length of the line may be saved, and about two miles of the heaviest part of the embankment above named, and the extra cutting through the summit ridge required in the first plan, avoided. These items must be encountered on the one plan, and must be offset against the tunnel, with the saving of distance on the other. The estimates of the engineers will shew their cost, and enable a more accurate opinion to be formed of their comparative feasibility.

The two descending lines which unite at the junction of the Tomaka and Muskingum vallies, will at that point afford a very considerable supply of water which can be used no farther for the purposes of the canal, and which may be used to very considerable advantage for hydraulic purposes. In crossing the Whitewoman near its mouth with the canal, by means of a dam, a surplus quantity of water may be introduced with reference to its use in this manner on the low level, near the mouth of Tomaka. A considerable revenue to the canal, as well as general advantage to the surrounding country, may be derived from the surplus water which must necessarily accumulate at this point.

On the accomplishment of the surveys on this line, the party was again transferred to the Licking and Walnut creek summit, and proceeded to the location of the line of canal, thence to the mouth of the Scioto. This line must be supplied with water, down the valley of Walnut creek to the level of the Lancaster crossing, by water drawn from the summit pound, and by the water of Walnut creek which may be introduced above that level. The water of the Walnut branch of Bigbelly may be turned into this level and thrown back in it, to its eastern termination. From the junction of the main line with the Columbus feeder to the Ohio river, the canal must be supplied by the water of that feeder including the water of Bigbelly, and by other feeders taken from the Scioto at different points, as may be required along that valley.

From the summit to Kinnikinnick, six miles above Chillicothe this line presents few obstructions to the safe and cheap construction of a canal. From this point to the Ohio, it wears a more rough and serious aspect, particularly that part of it between Kinnikinnick and the high bank prairie, or Kilgore's plain below Chillicothe. The location was continued on the east side of the Scioto to Portsmouth. It is, however, a matter of some doubt which side of

the river it will be best to occupy with the line. On the east side for some distance above and below Chillicothe the difficulties are of a serious character. The overflowed grounds above the mouth of Kinnickinnick, and below it on the river—the difficulties at cedar bluff, a sand and gravel bank of seventy feet in height, washed at its base by the river—the slip and sand banks at and below Hough's mill, and the wash banks at the high bank prairie, all present serious difficulties particularly the slip and sand banks at and near Hough's mill. On the west side from a point opposite the termination of the Pickaway plains, to a point opposite Piketon, the localities are much more favorable for the safe and cheap construction of a canal. But this side involves the responsibility and cost of crossing with the canal the Scioto, and Paint creek, and of recrossing the Scioto near Piketon; the west side of that river at its mouth affording no eligible site for the termination of the canal, being extensively overflowed by the floods of the Ohio. If it should be deemed advisable in any case to subject the canal and its interests to the liability to interruptions to its navigation from breaches of the dam across the river, it will unquestionably be desirable to cross and recross it with the canal. The difference in the expence and safety of a line on the west side of the river when compared with that on the east side, will unquestionably compensate for the cost of crossing the river should it be deemed expedient to subject the interest of so important a channel of commerce to the casualties incident to a passage of this river by means of dams. On this plan, the cost of obtaining feeders from the river, which will require the building of at least two dams, and the making of separate cuts for the conveyance of water from the dams into the canal will be avoided; as an ample supply of water can be drawn immediately from the river, in crossing it, by means of dams. It is also no inconsiderable inducement to cross the river, that it will accommodate the fixed capital in the town of Chillicothe, which would evidently be much distracted by the construction of a canal on the opposite side of the river, and some distance from it. This is a question which cannot be settled at the present time, as a location was made only on the east side of the river. Before it is settled a survey should be made on each side of the river, that a more critical comparison of the cost, and safety of the two lines may be made than the limited time of the acting commissioners would allow. It was desirable on their part to have made a location of line on each side of the river, but it was deemed inadvisable to do so at the risk of failing to complete the location during the season, of two entire lines through the state, as required by the last General Assembly. The line of location from the high bank prairie to Portsmouth, presents no very serious obstructions to the construction of a canal, though in many points it is rough, and will be comparatively expensive. To the mouth of Salt creek, it is of a favorable character; thence to the Ohio, the valley is in many places very narrow, affording barely sufficient space between the hills and river for a canal—which must encounter several narrow passes and rough points. There is, however, little or no appearance of rock excavation in any of these points.

The Ohio river at Portsmouth presents a favorable situation for the termination of such a work. The water is deep and the beach bold; and the anchorage ground for vessels is protected by the shape and course of the river banks above, from the effects of the floating drift wood and ice.

Having completed the location from the Licking summit, to the mouth of Scioto, the party was transferred to the Portage summit.

On the arrival of the party, under the direction of Mr Price, at this summit in the early part of August, it was deemed advisable to proceed with the location of a line, from that summit northwardly to Lake Erie. This accomplished, a continuous line would have been located from the mouth of Scioto to the Lake, on which the construction of a canal would undoubtedly be

practicable, and on which estimates of expence could be made, for the purpose of presenting to the General Assembly. This was extremely desirable in order to avoid any failure which might be occasioned by sickness, or any other unavoidable accident in completing the location of some one entire line.

In prosecuting our examination, it was desirable to ascertain whether a resort to the main Cuyahoga, for water to supply this summit, could be dispensed with. To avoid this necessity, is important, both on account of the expence of constructing a feeder from that river; and on account of the damage which the valuable water privileges on that stream will sustain by a diversion of its waters from their natural channel, during dry seasons. With a view to this object, a level was carried from the Tuscarawas at the junction of its two branches a point nearly south from the summit, to the Portage or summit Lake. By this level, it was ascertained that the Tuscarawas at the point above mentioned, is five and a half feet below the surface of the summit Lake, and about nine feet below the highest part of the intervening swamp, which extends from that Lake to the Tuscarawas. The distance from the Tuscarawas to this Lake is about two miles; and the surface of the swamp will average near six feet above the level of low water in the Tuscarawas. By cutting this summit down about 13 feet in the highest part or an average of 10 feet, (reckoning to the bottom of canal,) we can avail ourselves of the waters of the Tuscarawas, at the junction of the two branches above referred to, where it passed in August last three thousand cubic feet per minute, and in the driest part of the fall, two thousand five hundred. The summit Lake discharges its waters northwardly into the Little Cuyahoga, and through that stream into the main Cuyahoga river. This Lake is near three fourths of a mile in length, and contains one hundred and twenty acres. In passing northwardly from the Lake, the deep cutting will run out in about one quarter of a mile. The line passing along near the out-let, descends with it into the valley of the Cuyahoga.

The summit level, provided the canal descends the valley of the Tuscarawas, will be about ten miles in length; crossing the Tuscarawas near the junction of the two branches; extending from this point down the valley of that stream about five miles; and about the same distance northwardly across the summit, to the valley of the Cuyahoga. Immediately on locking down at each end of the summit level, an additional supply of water may at all times be had to replace the losses which may occur in the lower levels. The Little Cuyahoga where it comes in contact with the canal line, is a never failing stream, of at least one thousand cubic feet per minute, in dry seasons; and the Tuscarawas, as it descends, is constantly receiving large accessions of water from numerous springs and spring runs.

The average expenditure of water on this summit level, cannot exceed one hundred cubic feet per minute, for each mile of canal, or an aggregate of one thousand cubic feet per minute, for the whole level. This is a large calculation, considering one third part of the whole length cut into a swamp as low as the bed of the Tuscarawas. That river will therefore furnish the quantity of water required, and one thousand five hundred cubic feet per minute for lockage water in addition, without resorting to any other source of supply:—And no feeder will be required to throw its waters into the canal.

Adopting this plan, a level was assumed, as bottom of canal, four feet below the surface of the water in the Long Lake; which is situated on the south branch of the Tuscarawas, about half a mile above the junction. This Lake contains an area of two hundred acres, and may be used as a reservoir if required. The Portage or summit Lake, along the margin of which the canal line passes, may either be used as a reservoir, by suffering its waters to remain at their present elevation, subject to be drawn into the canal as occasion may require; or the surface of its waters may be reduced to the level

of the top water line in the canal; and by passing the canal line through it, and constructing a tow path along its margin, considerable excavation may be saved.

Between the summit level and the point where the canal line strikes the Little Cuyahoga, there is a descent of 50 feet. This descent may all be brought to one place and overcome at once, by means of moveable locks and inclined planes; or it may be distributed and overcome by fixed locks, at proper distances, in the usual method. The former method would be the least expensive; but the estimates of the engineer, have been predicated on the latter; as being the most safe and simple, and its utility more completely demonstrated by experience.

After passing something more than a mile near the Little Cuyahoga, the line enters the valley of the main Cuyahoga, and is conducted along the bottoms of that river, where the formation and qualities of the earth are favorable to canalling. Few difficulties occur and none of these are important, until the line reaches the Peninsula, so called. Here the river turns to the east, and after a circuit of near a mile, returns so nearly the same place, as to leave a narrow ridge, not more than twenty feet wide in the narrowest part connecting the land thus enclosed by the river, with the western bank. Immediately below this point are several wash banks, which taken together, form an aggregate length of near three fourths of a mile. To avoid these wash banks, it is proposed to cut through this isthmus where it is about sixty feet wide, and cross to the east side of the river, on an aqueduct formed by a wooden trunk supported by stone piers. The situation is peculiarly favorable for crossing: The canal line has sufficient elevation, and the bed of the river which is here 150 feet wide, and also the bank on the west side are rock. On the opposite side, a lock will be required, the mason work of which, with a little extension, will form the abutment on that side.

About one mile below this place of crossing, there is a sliding clay bank on the east side of the river of 30 rods in length. This may, however be avoided by turning the stream across a low narrow point of bottom on the opposite side, and conducting the canal near this artificial channel across the same point. To accomplish this work, will not be very difficult or expensive, as the river at this place never rises more than eight or ten feet in height, and has a rock bottom on which works may be erected with perfect security. This cut will shorten the canal line 22 chains, in the distance of half a mile.

After passing this place, the line is remarkably favorable for five or six miles; being located through extensive bottoms, out of the reach of floods, to the head of the Pinery Narrows. The extent of these narrows, in length, is about two miles: The river, in passing through this defile, and crossing from one side to the other, alternately makes wash banks on each side, leaving a narrow bottom on the other. The aggregate length of these wash banks, on the east side, is about three fourths of a mile; and about half that distance on the west. Through the narrows, the river runs over a smooth flat rock, very shallow, when the river is low. rising in floods to the depth of 8 or 10 feet. A wall of timber or stone of ten feet in height will effectually protect the canal along the foot of these wash banks; and when this wall is constructed, the additional expence of the canal will not probably be greater, than that of constructing a canal for the same distance on the most favorable ground. It may probably be found necessary to take in a supply of water from the Cuyahoga at this place; which may be done by means of a low cheap dam; and the expence of recrossing the river will be small should a line on the west side, below this place, be found, on examination, the most favorable.

From the foot of the Pinery narrows, to the head of Stillwater in the river on the lake level, the line is conducted along the bottoms and is very favorable, with the exception of four or five short points of hill, the base of which

are approached by the river. And these present no formidable difficulty. From the head of Stillwater, it is proposed to construct a tow path along the bank of the river to Cleaveland, six miles. This will require very little more than clearing the timber from the bank.

After having completed the location of the line down the Cuyahoga valley, the party next proceeded to the Black river; and commenced the location of a line at the head of the Lake level in that river, which is at the mouth of French creek, about six miles from the Lake following the meanders of the river. From the mouth of the river to this point, it is proposed to construct a tow path along its bank; in the same manner proposed in relation to the Cuyahoga.

In proceeding from the mouth of French creek towards the Killbuck summit, the line extends in a southeastwardly direction three or four miles; leaving the river at a sufficient distance to avoid the ravines formed by the streams which fall into it. It is impracticable to construct a canal along the immediate valley of Black river, without incurring a very great expence. The valley below the great falls at Elyria is generally very narrow, and near one hundred feet deep; the river frequently crossing from one side to the other, and alternately forming long wash banks on both sides, which are very high and nearly perpendicular.

Leaving the river so as to avoid this valley and most of the ravines extending from it as above stated; the line is very favorable until it reaches the south part of the township of Grafton, or township No 4, in the 16th range. The height of the country, then makes it necessary to approach nearer the river, and encounter a number of ravines. Across these ravines it will be necessary to form embankments, which will be attended with considerable expence. The obstacles presented by these ravines, are, however, by no means insurmountable; and considering the favorable character of the line in other respects its average cost will probably be less than ordinary lines of the same extent. No other difficulties of a serious character occur, until the line reaches the summit between the Black river and the Killbuck, which is in an extensive cranberry marsh in the township of Harrisville, here the cutting will be about 12 feet in the deepest part.

From this marsh, the water flows southwardly into Killbuck, and northwardly into two branches of Black river, which unite about two miles below.

The party next proceeded to finish the location of the feeder line, which had been run under the direction of Judge Geddes, from the Cuyahoga river to the Chippewa swamp. The location of this feeder was extended from this swamp to the Killbuck summit.

Having completed these locations, the party was again transferred to the Portage summit; and proceeded in the location of a line from thence along the Tuscarawas valley, to the junction of that river with the Whitewoman branch, at Coshocton; so as to intersect the line of canal, located from the Killbuck summit to Tomaka, in the fall of 1823.

The line from the Portage summit down the Tuscarawas, was commenced on that summit, at the junction of the two branches of Tuscarawas, at the same point where the line from that summit down the Cuyahoga valley was commenced. At this place it is proposed to cross the Tuscarawas by means of a dam, which at the same time will serve to throw the waters of that stream into the canal. By this dam the waters of the Tuscarawas, will be raised 6 to 8 inches above their present ordinary level, at the place of crossing; and up to the level of the water in the Long Lake on the south branch. This dam will be about sixty feet in length, and about five feet in height, above the bed of the river. The Tuscarawas is here a gentle stream, not subject to be much diminished by droughts, or swollen by floods; owing to the nature of the country which it drains, and to the numerous small lakes and low

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY, BY JOHN KILBOURN, AT \$3 A YEAR, IN ADVANCE.

COLUMBUS, OHIO, SATURDAY, AUG. 9, 1828.

NO. 8.

Readers will notice that the Canal Documents are continued on the third page of every number, from the last page of the preceding number.

From the Lancashire Literary Museum.

An account of the present state of the magnificent Tunnel under the town of Liverpool.

One of the greatest curiosities in or near Liverpool, or rather *under* it, is the tunnel commencing from that great sea port, forming part of, and leading to, the grand rail-road which is to run in an almost direct line, thence to the town of Manchester. A vast number of individuals, confined by business, during nearly the whole day light of the week, rush out to the neighborhood of Wavertree, on a spare afternoon, or on a Sunday, to witness the works above ground connected with this line of road, and with wondrous stories of vallies filled up and hills cut through, by the mandate of the engineer, to maintain the equality of the level. But they have no idea (unless they descend one of the shafts of the tunnel, and fearlessly explore the subterranean operations of hundreds of workmen) of the curiosity—we may say, of the daring grandeur of the works, far below the surface of the earth.

The entrance of the tunnel at Liverpool, is at a timber yard at Wapping, near the junction of the King's and Queen's docks, and it will terminate at the open railway at the back of the rising ground, about a quarter of a mile to the south of the church at Edgehill. The bore has been for sometime going on from the latter spot, and will soon reach a long line of completed tunnel which passes close behind the Botanic garden.

The first thing that will rouse the curiosity of the scientific visiter to the tunnel is, why when he alights at the bottom of the pit, he is not then in the line of the grand excavation. In several of the pits he will observe, when he lands, a tunnel driven, for several yards, directly from the bottom of the pit—as, indeed, it ought to be, for the convenience of the miners. But this line of tunnel was scarcely commenced before it was given up. The engineer at first employed, drove the eyes or pits, by some mistake, about thirty feet to the south of the intended line; and as soon as this was discovered, a small tunnel or archway, was cut from each eye to the north, opening into the main cut.

The tunnel is almost entirely cut through a mass of red free stone, occasionally streaked with white and yellow, and with various degrees of hardness. It is twenty-two feet in width, and about sixteen in height, rising three quarters of an inch to the yard, as it

runs to the eastward: and if the reader reflect that this excavation or cavern, will extend when completed, in a direct line to the back of Edgehill, the whole handsomely arched overhead, and lighted up with gas; if he reflect, moreover, that three mail coaches, might with ease drive through it abreast, he may form some idea of this magnificent subterranean passage, which is, assuredly, as a national work, one of the grandest undertakings of the age, and does infinite honor to the projectors, and to the engineer, who has successfully conducted the operations towards their completion. The whole extent of tunnel will be about 2200 yards, and of this, except towards its termination at the Queen's dock, only a few hundred yards remain to be excavated. A great deal of archwork is driven in the solid stone, and where that has been found defective, soft or insecure, the arch has been completed with brick work. The proportion of brickwork throughout the whole line is between a third and a half. The sides of the tunnel rise about five feet perpendicular, and form abutments for the arch, which is a correct semicircle, so equally made, that the same frame work may be driven on rollers from end to end, and every where to fit the curve. Now that several of the shafts communicate with each other, either by the completion between them of the grand tunnel or by a smaller four foot tunnel running along the intended roof, a fresh current of air is continually circulating, and the visiter will experience none of the oppressive sensation generally felt in the mines not thoroughly ventilated. Neither is the air raw or chilly, but of a mild and equal temperature. The miners have met each other, in the excavations from the different shafts, with amazing precision, scarcely half an inch of difference in the cut being observable at the junction of the bore.

We had scarcely entered the tunnel ere the noise of approaching wagons laden with broken stones, roared along the vaulted roof, and presently we could distinguish the rays of the driver's candle struggling through the vapor occasioned by the last explosion. Four wagons, on each of them was a large square bucket holding about a ton of broken stone passed us at a rapid rate, drawn on a railway by one horse, and were speedily and successfully hooked to the rope, and hoisted to the top of the pit. We had not gone far ere an explosion bursting along the whole vault, sensibly shook the very rock on which we stood, and thundering on to the west died gradually away. We were then under Hope street; and my conductor informed me that the blast had taken place at a spot beyond the mill at Edgehill, the sound having travelled part of the way through a small tunnel some distance above us.

The principal tool used in excavating the stone is the pick, and we could no hear distinctly the sound of numbers of them, cutting and knocking with ceaseless activity. We proceeded to the eastward a distance of about 350 yards, when we could perceive, gradually brightening in the smoke as we advanced, the numerous candles of the workmen, who are mostly engaged in scooping along the top, leaving a mass of stone in the middle on which to stand, and which is afterwards removed. As we once before had occasion to remark, the candles seen through the intermediate darkness, were not unlike twinkling stars on a gloomy night; and the figures of the men here and there illuminated by the light and flinging their brawny arms about, would have furnished a writer of romance with no bad idea of some infernal operation going on under the direction of the *old gentleman* himself.

The tunnel, and the labour above ground immediately connected with it, give employment to about three hundred men. We have not yet visited that part of it west of White street, where it runs a long distance under the populous part of the town; but our guide informed us that there the workmen were obliged to proceed more cautiously than those higher up, cutting away a small portion only at a time, and throwing over that a secure arch before they proceed. There, too, no blasting of the stone takes place; the whole being split away by the hammer and wedge. The nature of the ground, and the proximity of this part of the tunnel to the surface, render these precautions necessary. The tunnel will, of course, terminate as near as possible to the level of the dock-quays; and on this account it is, in some parts only a few yards below the streets. The workmen, can hear, we are told, the carts running over their heads and even the shouts of the drivers and the voice of the passengers. The bottoms of several wells have already been cut away, to the no small astonishment of the owners.—One or two houses sustained some injury by partially sinking a little; but no serious accident has occurred; and when the work is completed, which with the exception of a small part near the docks, will be in a few months, the ground will be as firm as if there were no tunnel beneath it. We have not heard of a single loss of life in the tunnel,—thanks to the goodness of the machinery, and the masterly direction of the works.

The advantages of the tunnel are many of them almost too obvious to require explanation. The railway will proceed in a direct line, by the gentlest possible acclivity, and without any of those interruptions which could not be avoided above ground, to its junction with the grand open rail road behind Edgehill; and steam or any other power may be employed within it, without any annoyance to the public.

After a subterranean excursion for about an hour and a half, we ascended the eve near the Mount, and again found ourselves within "the warm precincts of the cheerful day."

We had we may say, walked and sailed under ground from White's Mill, Edge-hill, to beneath Great George's-square.

The open rail-road, on nearly the whole length of the line to Manchester, is in a state of great forwardness, and presents many interesting objects to the visitor.

MUSKINGUM SIDE CUT.

From M. T. Williams, Esq. one of the acting canal commissioners, who called at this office on Wednesday last, on his way from the eastern or Ohio, to the Miami Canal, we learn that he has just put under contract for construction, the *Muskingum Side Cut* at Dresden.

This is a short lateral canal, 2 miles long, connecting the Muskingum river with the main canal. It has an ascent of 29 feet; which is overcome by three lift locks. By means of this *Side Cut*, canal boats can float into the Muskingum river; and down that river to Zanesville, about 15 miles.

To render this 15 miles of the river, to all practical purposes, a branch of the main canal, only one dam, with a steam boat lock therein, is necessary between Dresden and Zanesville. A steam boat, of the very smallest and cheapest class, might then ply, regularly twice a day, between these two places, taking in tow, at either end of the route, all the canal boats ready for sailing, at the regular hour for the steam boat's departure. Thus the manufacturers of iron, flour and salt, at Zanesville; and those people living in any other part of the state, along the canal line, would derive nearly all the advantages, which they could have enjoyed, had the canal passed directly through Zanesville.

This 15 miles of slack-water navigation, would probably cost much less, and produce a greater revenue, than any other fifteen continuous miles of canal line in the whole state. It would, therefore, seem to be for the interest of the state to construct this one dam, before-mentioned, and then avail themselves of all the advantages resulting therefrom. Accordingly, we would respectfully, recommend, to those, whose province it is to determine this point, a consideration of the expediency of this measure.

The state has already, through the agency of their acting commissioner, Mr W. secured 10 acres of ground at the locks near Dresden, as a site for mills and hydraulic machinery. The water power will be vast;—as all the surplus waters collected, in descending from the Portage summit along the valley of the Tuscarawas river, and also from the Licking summit, to the Wakatomica creek, are here to be discharged. The fall is 29 feet: so that the water could be advantageously used two or three times over.

OHIO MAPS.

The editor of this paper has just revised his Maps of the state of Ohio,—one large, upon the scale of 10 miles to an inch;—the other small, being drawn upon a scale of 40 miles to the inch: so that it is but little more than six inches square. It is beautifully engraved, and printed on bank note paper. Price 18 cents; or 12 cents if several are taken together.—Price of the larger ones \$1.50 each; or one dollar if several are purchased together. The canal routes are correctly delineated on both.

prairies through which the river and its branches pass. The stream above this point, is formed almost entirely from constant springs; and the lakes and low prairie grounds through which it runs, receive the floods upon their expanded level surface, and prevent a great rise of water. No guard locks, or gates will therefore be necessary, to prevent injury by freshets.

From this point, the line passes southwardly along the valley of the Tuscarawas, generally on level or gently sloping grounds, encountering a few steep sidelying banks of no great extent or difficulty, to the place where it recrosses the river a few miles above old Fort Lawrence. Here it is proposed to construct an aqueduct which will require to be 210 feet long.

After crossing the river at this place, the line keeps the right or west and north side of the valley, until it crosses the Whitewoman branch of Muskingum, about half a mile from its junction with the Tuscarawas, and intersects the Killbuck line nearly opposite to Coshocton.

Much the greater proportion of this section of the line is located on second bottoms or high alluvial grounds, above the reach of high water, of easy excavation, and generally presenting great facilities for the construction of a canal. Considerable difficulties, however, occasionally present themselves. The most formidable of these, are near New Philadelphia, in Tuscarawas county. The crossing of Sugar creek will require a dam of 100 feet in length, and 8 feet in height, and a low embankment across the bottoms near its junction with the Tuscarawas. About one mile below the mouth of Sugar creek, the line passes over a low bottom, at the mouth of Stone creek, which will require considerable embankment; and then encounters a rocky side hill, which is however of no great extent. At Oldtown is a gravel bank, the top of which is elevated $13\frac{1}{2}$ feet above the level of the canal, for 36 chains, the brow of which must be cut down to the level of the line. A short distance below this the line passes over another low bottom on Oldtown creek; and then along near the foot of a stony side hill, the base of which is washed by the river, for about half a mile; and a short clay bank which is inclined to slip, near the old Indian town of Goshen. From thence, the line is very good to Gnadenhutten, with the exception of two points of side hill of no great extent, which are washed at their base by the river.

From Gnadenhutten to a point two miles below Neighbortown, a distance of fifteen miles, the line is located on ground of the most favorable character, and presents nothing which merits the name of difficulty. Between this place and the crossing of Whitewoman branch, four points of the hill project in, to the margin of the river; and some low bottoms occur, which, however, will generally require but one artificial bank, the line being located along the foot of the hill, or of the bank between the first and second bottoms.

It is proposed to cross the Whitewoman by means of a dam, and take in a portion of its waters, to supply the canal from thence to Tomaka. At the place of crossing, the high bottoms approach to the margin of the stream on the northeast side; but on the opposite side, an embankment will be required, of near a quarter of a mile in length, which will average about six feet in height, to the top of the tow path.

Sandstone every where abounds, in the hills which skirt the Tuscarawas valley; and limestone is also found in the same hills. Stone may be obtained for the security of such banks as are exposed to the current of the river, and also for the construction of aqueducts, culverts and locks, with the greatest ease, and in the greatest abundance, all along the Tuscarawas and Cuyahoga vallies. The southern part of Killbuck line, and the northern part of the line on Black river, are also abundantly supplied with stone of an excellent quality.

In our report to the General Assembly at their last session, the line which had been located along the Killbuck valley, was described, in general terms, as being one which affords great facilities to canalling. The review of that line by Judge Bates, during the present season, and the estimates made on the cost of constructing a canal along that valley, have disclosed no facts which require a change of that opinion. On this line there are some low bottoms, across which it will be necessary to embank; and it is proposed to turn the Killbuck out of its present channel across a neck of land of about half a mile broad; by making an artificial cut for the stream, and another parallel with it across the same point for the canal; in order to avoid a great bend and a long, steep, rocky bank near Fox's mill. These difficulties are the most important which occur on the Killbuck line, and they are by no means insurmountable.

By reference to our report to the General Assembly at their last session, it will be seen, that there were three different plans proposed, for constructing a canal from Coshocton to Lake Erie. The first, to proceed up the valley of the Killbuck, across the summit between that stream and Black river, and down the valley of that river to the Lake. The length of this line from Coshocton to the termination of the Lake level in Black river, is 98 miles 33 chains. To supply the upper levels on this line with water, will require a feeder of $49\frac{1}{2}$ miles in length, extending from the Cuyahoga in Stow, across the Portage summit, thence along the Tuscarawas to a point near the mouth of Chippewa, thence along the valley of the latter stream and through the Chippewa swamp to the Killbuck, thence down the channel of the Killbuck to the southern extremity of the Harrisville swamp. Forty miles of this feeder will require an artificial cut; and the remaining $9\frac{1}{2}$ miles, will occupy the channels of streams along which it passes. Part of this artificial cut will be very expensive. That section of it between the Cuyahoga and the village of Middlebury, will require rock excavation, or occupy sidelying ground, throughout the greater part of its extent; and to command the waters of the Little Cuyahoga, and the Tuscarawas at the junction of the two branches heretofore described, will require two deep cuts—one near the village of Middlebury of a mile in length, and thirty feet deep in its deepest part; and the other through the Chippewa swamp, of about four miles in length and nineteen feet cutting, at the highest part of the swamp.

The total length of canal line and artificial feeder on this route, from Coshocton to the Lake, will be about $138\frac{1}{2}$ miles—and the lockage 480 feet.

It is an important question to determine, whether the route by the way of the Killbuck and Black river can be supplied with water. That part of the line, extending from a point about six miles north from Wooster to the mouth of French creek, the head of the Lake level on Black river, must be furnished in dry seasons with water introduced at the summit. The Killbuck receives no considerable accession of water, between the summit and the point above mentioned. Black river near the summit, only passes 20 cubic feet of water per minute, in dry seasons; and not more than 150 below the junction of its two main branches at Elyria. Even this small supply cannot be obtained from Black river, without dropping the canal line into its immediate valley, and encountering the difficulties resulting from that course, which have been enumerated.

The length of line which will thus require its supply from the summit pound, is 45 miles; and if to this we add the length of the artificial part of the feeder from Cuyahoga, the whole distance to be supplied will be 85 miles. To meet the demand required for expenditure on this length of line, there

may be drawn from the main Cuyahoga, per minute,	4000 cubic feet,
From the Little Cuyahoga,	800
From the Tuscarawas,	2500
From Wolf creek,	250
From the Portage Lake,	100
From Chippewa Lake by cutting down its outlet to 6 feet,	500 during 3 months
From Killbuck,	90
	<hr/>
Making in all,	8240
If from this amount is deducted for lockage water per minute, say	1500 cubic feet
	<hr/>

There will remain to supply the expenditure occasioned by leakage, soakage and evaporation 6740

Equal to 30 cubic feet per minute, for each mile of canal and artificial feeder. Whether it will be safe to construct a canal relying on the above quantity of water, is a question which should be decided by a particular reference to the character of the line, which is dependent upon these sources for its supply. A more minute and careful examination, requiring more time than the duties assigned us have enabled us to devote to this subject, may be proper, previous to a final decision of the question.

Should the route by the way of the Killbuck to the summit near the head of that stream, thence by the Chippewa creek to the Portage summit, and down the Cuyahoga, be adopted; only 49 miles of this line, extending from the point six miles above Wooster, to the valley of the Little Cuyahoga, will require its supply from the sources above enumerated. If to this distance be added eleven miles, the length of a feeder from the Cuyahoga to the Portage summit, the whole length of canal line and feeder to be furnished with water from these sources, will be 60 miles—25 miles less than on the Killbuck and Black river route. From the best calculations we are able to make the supply of water on this plan will be ample.

The length of the canal from Coshocton to the Lake level in the Cuyahoga, by the way of Killbuck, Chippewa and Portage, will be 135½ miles; and that of the feeder from Cuyahoga to the summit, 11 miles as above stated making the total length of canal and feeder line 146½ miles. The whole amount of lockage on this route, from Coshocton to the Lake, is 595½ feet.

If the route by the way of the Tuscarawas and Cuyahoga be adopted, no feeder from the Cuyahoga will be required to supply the summit level; the waters of the Tuscarawas where the line crosses that stream being abundantly sufficient. The total length of this line, as located, from Coshocton to the termination of the Lake level in the Cuyahoga, is 132 miles 47 chains. This line will be made 2 miles 22 chains shorter by crossing the Tuscarawas at a different point above Fort Lawrence, so as to avoid a great bend in the river, and by cutting off the point of land at the clay bank on the Cuyahoga. The length of this line will then be reduced to 130 miles 25 chains, and the amount of lockage the same as on the last described route; 595½ feet.

In conformity with the requisitions of the act of the last General Assembly, the board has caused surveys to be made of the harbors at the mouths of the Cuyahoga and Black river. Both these rivers are sufficiently deep to admit vessels of the largest class which can advantageously navigate the Lakes, for a much greater distance from their mouths than will ever be required for harbors; and are sufficiently capacious to accommodate any commercial business which will ever be transacted on the Lake. The Cuyahoga will average sixteen rods wide for two miles from its mouth, in many places it is twenty rods broad. Black river will average thirteen rods wide for the same distance from its mouth.

The entrance into both these rivers from the Lake, is, at times, subject to be obstructed by bars at their mouths, so as to prevent the entrance of the medium class of vessels which navigate the Lake. This is the only difficulty worthy of note attending these harbors. The channel into the mouth of Black river, although it is never so deep as that into the Cuyahoga is at certain times, is never so much obstructed; it is much less subject to change. There is not as much moveable sand near the mouth of the Black river, as at the mouth of the Cuyahoga.

The bars at the mouths of both of these rivers are formed by sand which is gradually carried along the beach, by the waves which strike the shore obliquely, and is deposited in the mouths of these streams, when the current in the rivers is not sufficiently strong to remove it. At both places, the bar is formed from the eastern shore and the channel is gradually driven to the west, as the bar is forming. This is owing to the shape of the coast, which prevents the waves from running in a direction to bring the sand from the west towards the mouths of these rivers.

These obstructions to navigation are not formed by the immediate deposite of the rivers. Were this the case the bars would be increased by floods, at which time alone, the current is sufficiently strong to carry with it sand or other materials to form a bar; and the channels always being best after floods have subsided, proves incontestibly, that the bars are formed by some cause other than the immediate deposite of the rivers at their mouths.

To prevent these obstructions, it is proposed to extend a pier from the shore into the Lake, nearly at right angles with the course of the beach on the east side of the river. This pier must be extended into the Lake to a point where the water is sufficiently deep to float vessels of the largest class navigating the Lakes; and where the sand at the bottom is little affected by the operation of the waves. To effect these objects it is proposed to terminate the pier where the water is thirteen feet deep; which will require a pier of 1056 feet in length. This pier is to be formed by driving two rows of piles ten or twelve feet apart; the piles, forming each row, to be driven contiguous to each other, or as nearly so as can be done, securing these piles in their proper places at the top, by fixing heavy pieces of timber lengthwise on each row, and binding the two rows by cross ties at proper distances, and filling the space between the two rows of piles with brush and stone. The bed of the river, and of the Lake near its mouth, is blue clay covered near the shore with sand, both at the mouth of the Cuyahoga and of Black river—stone in any quantities required may be had, at either of these places, by bringing them from 5 to 7 miles in boats. The length of the pier required at the mouth of the Cuyahoga or of the Black river, will be the same.

This pier, when erected, will have the effect of arresting the sand as it is carried by the waves along the beach towards the mouth of the river; this sand will be deposited in the angle formed by the pier and the line of the shore, on the opposite side of the pier from the mouth of the river, and the channel, which has been formed by floods, will remain open.

This theory has been tested by experience, both at the mouth of Buffalo creek and of Grand river on the same Lake. Both these streams were more subject to be obstructed by the formation of bars at their mouths, than either the Cuyahoga or Black river. The works at Buffalo creek, constructed on the same principle here proposed, have effectually secured an entrance into that stream for vessels of the largest size; and the improvements at the mouth of Grand river, though very incomplete, have secured a channel at all times for vessels of the ordinary class navigating the Lake.

The works at both these places have never received any material injury from storms or drifting ice, although one has stood the test of two, and the other of four or five seasons; and in both instances they are more exposed than similar works would be at either the Cuyahoga or Black river.

The cost of securing a channel at the mouth of either of these rivers, on the plan proposed will be, according to the estimate of Judge Bates, something short of five thousand dollars; but that sum is assumed as one sufficient to cover all contingent expenses.

A more detailed view of the plan of forming these piers, and of the estimated cost of their construction, will be seen by reference to the report of Judge Bates on that subject, and to the plans and charts herewith submitted.

The following statement will exhibit, at one view, the total length of the Muskingum and Scioto route, together with the amount of lockage and the estimated expence of its construction, on each of the three different lines proposed, between Coshocton and the Lake.

Route by way of Killbuck and Black river.

The distance from the mouth of Scioto to the South fork of Licking as located, is 125 miles, 34 chains.

From the South fork of Licking to Coshocton,	50	69
From Coshocton to the Killbuck summit,	63	25
From the Killbuck summit to the Lake level in Black river,	35	13

Total length of main line by way of Killbuck and Black river,	274	61
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To this add, Columbus feeder, length 10 m's 45 c's

Feeder from Racoon fork of Licking, 5 00

Feeder from Cuyahoga to Killbuck summit,	49	40
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Total length of feeders,	65	05
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Aggregate length of canal line and feeders,	339 m's	66 ch's.
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The lockage on this route is as follows:

From Licking summit to mouth of Scioto, four feet below surface of low water in the Ohio, 408.67 feet

Killbuck summit to Coshocton,	155.67
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Coshocton to Tomaka,	26.00
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Total lockage descending south,	580.36 feet
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From Licking summit to Tomaka,	152.03
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Killbuck summit to Lake level in Black river, seven feet below the surface,	336.94
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Total lockage descending north,	488.97
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Total amount of lockage on this route,	1069.33
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The expence of constructing a canal on this route agreeably to the estimate of the engineers, is as follows:

From the mouth of Scioto to the junction of the Tuscarawas line near Coshocton, including reservoir at Licking summit,	1,675,240 51
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From Coshocton to Lake Erie by way of Killbuck and Black river	951,330 49
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Total expence of main line of canal on this route,	\$2,626,571 00
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Columbus feeder	50,191 71
Racoon fork feeder	14,681 78
Cuyahoga feeder,	364 923 98

Total expence of feeders added,	429,797 48
Harbor at the mouth of Black river,	5,000 00

Total amount of expence of canal, feeders, reservoir and harbour, on this route,	\$3,061,368 47
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Route by way of Killbuck, Chippewa and Cuyahoga.

Length, from mouth of Scioto to Killbuck summit agreeably to the above statement, 239 miles, 48 chains

From Killbuck summit to Portage,	34	21
From Portage to the Lake level in Cuyahoga, (after deducting 22 chains at clay bank)	38	23

Total length of line on this route,	312	12
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To this add. length of Columbus feeder 10 m's 45 c's

Racoon fork feeder,	5	00
Feeder from Cuyahoga to north end of Portage summit,	11	00

Total length of feeders,	26	45
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Aggregate length of canal and feeder lines on this route,	338	57
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The lockage on this route, is as follows:

From the Licking summit to four feet below surface of low water in Ohio, at Portsmouth,	408.97
Portage summit to Coshocton,	203.75
Coshocton to Tomaka,	26.00

Total lockage descending south,	638.42 feet.
From Licking summit to Tomaka	152.03
Portage summit to Lake level, seven feet below surface of water,	395.00

Total lockage descending north,	547.03
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Total amount of lockage on this route,	1185.45
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Expence of construction on this route:

From mouth Scioto to Coshocton as per previous statement,	1,675,240 54
From Coshocton to Killbuck summit,	492,462 67
From Killbuck summit to Old Portage bridge,	320,288 02
From Old Portage bridge to Lake Erie,	446,033 21

Total expence of main line on this route,	\$2,934,024 44
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FEEDERS:

Columbus and Racoon fork feeders, as per statement above,	\$64,373 49
Feeder from Cuyahoga to north end of Portage summit,	127,531 12

Total expence of feeders on this route added	192,404 67
Harbor at mouth of Cuyahoga,	5,000 00
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Total amount of expence of canal, feeders, reservoir and harbor on this route,	\$3,131,429 02

Route by way of Tuscarawas and Cuyahoga.

LENGTH:	miles	chains
From mouth of Scioto to Coshocton as above,	176	23
Coshocton to Old Portage bridge with deduction, above Fort Lawrence.	92	02
Old Portage bridge to Lake level in Cuyahoga as above stated	38	23
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Total length of main line on this route,	306	48
Add length of Columbus and Racoon fork feeders,	15	45
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Aggregate length of canal line and feeders	322	13
The total amount of lockage on this route is the same as on the Killbuck, Chippewa and Portage route, viz: 1185.45 feet.		
Expence of construction on this route:		
From the mouth of Scioto to Coshocton as above stated,	\$1,675,240	51
From Coshocton to Old Portage bridge by way of the Tuscarawas valley,	610,562	64
From Old Portage bridge to Lake Erie as above,	446,033	21
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Total expence of main canal line on this route,	2,731,836	36
Add expence of Columbus and Racoon fork feeders as above stated,	64,873	49
Add expence of harbor at mouth of Cuyahoga, as above,	5,000	00
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Total expence on this route,	2,801,709	85

To the estimated expence of constructing a canal on either of the proposed routes, it may be proper to add ten per cent. to cover expences of superintending the work, and contingencies which may occur. Although the greatest care has been taken to estimate the cost of every part of the work, it is possible that some small items of unforeseen expence may have been omitted.

Maumee and Miami Route.

Early in May, a second locating party was organized, and transferred to the Loramies and St. Mary's summit, when the location of the line from that summit to the Ohio river was commenced. The level of this summit (cut down 12 feet) was continued 62 miles 42 chains to Jackson's creek, a branch of Mad river, down the valley, of which, with a descent of 81 feet in a distance of less than one and a half miles, the line was located, into the immediate valley of that river at a point about 17 miles above Dayton. This extensive level presents almost every variety of feature from that which is very rough to that which is of a favorable character. From the summit to Cynthian, a distance of about eight miles, the line presents no serious obstacles to the construction of a canal. The deep cutting at the summit, 12 feet at the highest point with a gradual descent south to proper cutting, is the most

formidable item in it. The canal must cross the Loramies creek three miles south of the summit by means of a dam. From Cynthian the line is confined to the immediate valley of Loramies creek to its junction with that of the Miami. It then ascends the valley of that stream, about three miles to a point called the narrows or high rocks where it crosses the river, requiring for that purpose an aqueduct, the top water line in which must be about 60 feet above low water in the river. The river between the rocks is about 150 feet wide, with rock bottom. After crossing the river the line turns immediately down it and continues in that direction for about three miles, when it commands the upland country, and leaves the immediate valley of the river. From Cynthian to this point a distance of 22 miles, the line presents many serious difficulties. The necessity of keeping up the level of the summit which exists, in order to supply it with water from the Miami and Mad rivers, throws the line on much steep sidelying ground, many sharp points, and over deep vallies and ravines which increase in magnitude and difficulty as the valley of the creek descends. From the junction of the vallies of the creek and river up to the proposed aqueduct across the river, and from that to the point where the level of the summit commands the upland country, the line also occupies ground of a similar character. At Turtle creek a branch of Loramies an embankment of 5 to 33 feet in height and 32 chains in length, is required. Another embankment of 6 to 30 feet in height and 18 chains in length is required in passing Mill creek, another branch of Loramies creek. This section of the upper level will necessarily be costly to construct, and will be in some degree liable to casualties, and to waste water when constructed. From the point where it leaves the immediate valley of the Miami to the southern termination of the upper level, the line presents a more favorable aspect. It passes several small streams which will require considerable embankments with aqueducts and culverts, and occupies some sidelying ground, and rough undulating surface.

This long level must be supplied with water by a feeder from the Miami, which is introduced at the aqueduct; and by a feeder from Mad river which is introduced at the southern termination of the level. The Miami feeder is 10 miles and 40 chains in length, and occupies some very rough and sidelying ground. It will receive from the Miami about 1740 cubic feet of water per minute, and from Musqui o creek, about 500 feet. The Mad river feeder is 14 miles and 60 chains in length, and will be a very costly line to construct. The first two miles of this feeder, commencing at its head, passes through the alluvial bottoms of Mad river and presents an easy line for construction. It is then thrown on to sidelying ground as the valley of the river descends, which it does very rapidly, and is continued on ground of that character to a point half a mile above the bridge across Mad river on the Springfield road, where to avoid a great bend in the line, and some ledges of rock which must be encountered on any other plan, it crosses a narrow ridge, the highest part of which is 42 feet above bottom, and the length of extra cutting 16½ chains. After passing this deep cut the line intersects the valley of a small creek, to pass which will require an embankment 47 feet high, and five chains in length with a short aqueduct or large culvert. At the termination of this embankment is the commencement of a ledge of rocks which borders the valley of the creek to its mouth, and then extends down the valley of the river for a distance in the aggregate amounting to 151 chains. This ledge is composed of limestone rock, and presents mostly a perpendicular front along the face of which the feeder must pass, in many places 30 to 40 feet up from the general surface of the ground beneath, and yet not sufficiently high to command the top. From the termination of this ledge of rocks to the junction of the feeder with the main line, it occupies much sidelying ground, and passes several deep vallies, some of which have considerable width.

Mad river will furnish this feeder with about 10,000 cubic feet of water per minute in a dry season. In addition to these feeders several small intermediate streams of a durable character may be introduced into the upper level, amounting perhaps to 500 cubic feet per minute. The quantity of water which may be commanded for the supply of this level, and that part of the line to the north dependent upon it for water, will stand thus:

From the Miami river,	1740 cubic feet
Musquito creek, thrown into the Miami feeder	500
Mad river,	10,000
Intermediate streams,	500
	<hr/>
	12,740

Immediately at the foot of the locks required in the descent from the south end of the upper level into the valley of Mad river one and a half miles from the junction of the Mad river feeder with the upper level, another feeder from that river may be introduced into the canal by a cut not exceeding three miles in length, requiring only the construction of a dam across the river, and simple excavation of the easiest character. The introduction of a feeder at this point will obviate the necessity of drawing from the summit pound south any water except what may be required to pass boats through the locks, and to supply the evaporation and wastage on less than one and a half miles of line. In this manner the greater part of the water furnished by the Mad river feeder will be left for the supply of the summit pound and line north of it.

From the termination of the upper level to Dayton, a distance of about 18 miles, the line, after dropping into the valley of Mad river, follows the immediate valley of that stream to Dayton crossing the river by means of a dam about one mile above its mouth. The situation is a favorable one for crossing this stream with a canal. At this point the river washes, on its right bank, a plain elevated several feet above its floods—and it is the only point for some miles above, and to its mouth below, similarly situated. By dropping a lock near the river on the north or west bank, bringing the canal to a level with the water in the river raised three or four feet by a dam, and by constructing a guard lock on the opposite bank, the floods of the river may be effectually controlled, and the safety of the canal placed beyond question. The lockage on this section amounts to 203 feet, viz: 81 feet in the immediate descent from the upper level into the valley of Mad river, and 122 feet from this point to the crossing of the river near Dayton. There are no obstructions or difficulties in this line; the greater part of it presents nothing but plain excavation, and that of the easiest character. The descent in the Mad river valley is so considerable as to make the lockage in this section the heaviest item of cost. Suitable stone for the construction of these locks abounds in convenient situations, particularly near the head of this line, and at one point six or seven miles above Dayton. After crossing the river, as above, the line passes through a prairie of near half a mile in extent, which is partially overflowed. The excavation will, however, make a sufficient bank on the lower side to protect effectually the canal from injury. The flood water is entirely eddy, and comes on this prairie from below the proposed dam.

From Dayton to Cincinnati this line, 66 miles 71 chains in length, assumes generally a very favorable aspect. To Middletown, a distance of about twenty-three miles, it is of the most favorable character, with the exception of two points. The first is situated about three miles below Dayton: The second at and immediately below the mouth of Clear creek below Franklin. The first of these difficulties is occasioned by the contact of the river (the Miami) and the highlands, for the distance of 48 chains. To pass this will

require a wall of stone work at low water line, or an embankment of earth and loose fragments of stone, protected on the out side from abrasion by the floods, by loose stone. This wall or embankment, must be raised of sufficient height to protect the canal from the floods of the river, which rises from 12 to 15 feet. It is believed that such a work can be built and sustained without difficulty. The bottom of the river is composed of detached masses of rock, and at this point the river is very shoal. The adjoining hills and bank are composed of loose masses of stone, gravel and other materials necessary for the construction of the embankment or wall. The second of these difficulties is of a character very similar to that of the first, though of an aspect somewhat less formidable. The river does not bear so hard upon the hill, as at the first point. A wall or embankment will be required to pass this difficulty very similar to that above described.

This line as far as Middletown, can be supplied with water without any cost on account of feeders. The crossing of Mad river above Dayton with the line of canal by means of a dam, will afford any supply of water from that stream which may be required for the purposes of navigation—and an additional quantity may be drawn from it for the supply of hydraulic works along the line below, without injury to the valuable works already in operation at Dayton.

From Middletown to the Ohio river at Cincinnati, a distance of about 44 miles by the line of location, there are few serious obstructions. With the exception of half a mile of side hill near Irwin's mill on Mill creek, which has a tendency to slip, and three or four miles in the same vicinity, of sidelying ground and a few points of inconsiderable difficulty on the Miami between Middletown and Hamilton, this line is of the most favorable character. It presents nothing but proper cutting of the easiest character. The line follows the immediate valley of the Miami river to Hamilton, and then bears off from the river on a level plain, with proper cutting, and passes into the valley of Mill creek along the margin of some ponds and swamps, which in flood time flow into that stream. The excavation to get into the valley of Mill creek from that of the Miami does not exceed five feet depth at any point. There is not in the whole, a half mile of the line which amounts to that depth. Down the valley of Mill creek there are no obstructions until the line reaches the sidelying grounds near the Ohio. These, though difficulties, are not of the most serious character.

From a point on Mill creek near White's mill, about nine miles from the Ohio, two lines were run. One on the principle of keeping up the level so as to command the upper plain on which Cincinnati stands, entering the Ohio at the mouth of Deer creek above the town. The other, by locking down the valley of Mill creek as it descends, and passing on the west of that plain to the lower plain of the town. The first of these lines, in consequence of keeping so high a level, will cost something more than the second or lower level. The difference, however, will not be great, as the lockage, which on the lower line is distributed along the valley of Mill creek for a distance of seven miles, is on the plan of the upper line, thrown into the valley of Deer creek near the river, where suitable stone for their construction can be had from the bed of the Ohio, without the cost of hauling them six to seven miles. But should the difference in the cost of these two lines be considerable, the superior value for hydraulic purposes, which the surplus water that might be thrown to that point would have on the upper plain over its value on the lower plain, will probably more than compensate for the difference in the cost of the two lines. The upper plain is elevated 108 feet above low water, and fifty feet above high water in the Ohio. The surplus water that might be conveyed into a basin on the upper plain, with so great a power for its use, might be made a very considerable source of revenue to the ca-

nal without interfering with its usefulness for navigation, the primary object of its construction.

This section from Middletown to Cincinnati may be supplied with water from the Miami with but very little expence. By a cut of 24 chains the mill race of Abner Enoch, near Middletown, may be turned into the canal. Building a dam and enlarging this race will be all that is necessary to command from the river any quantity of water which may be required for the supply of the canal to the Ohio. As much water may be introduced at this point as can be thrown forward through the canal without injury to the navigation, without sensibly affecting the mills on the river below. This surplus water may be very profitably used at several points in the valley of Mill creek by throwing it, at the heads of locks, on to wheels and taking it again into the canal on lower levels, loosing nothing except the extra evaporation and absorption occasioned thereby.

The surplus water which may be passed through the canal and used for hydraulic purposes, both in the valley of Mill creek and at Cincinnati, would unquestionably be a source of considerable revenue to the canal, and of general benefit to the surrounding country. It may be remarked also, that at no points within the state would this hydraulic power be so great a source of revenue as at these.

The surrounding country sustains a dense population and is almost entirely destitute of water power. The same remarks will apply in some degree to the line from Dayton to Middletown.

Suitable stone for the construction of locks may be obtained near Dayton, and in the bed of the Ohio river near Cincinnati. Through the intermediate parts of this line, stone of the proper quality for that use has not been discovered convenient to the line. Stone of a good quality may however be transported from Dayton and points above that, by water, and deposited near the sites of the locks between Dayton and Hamilton.

On the completion of this line to the Ohio, the party, under the direction of Mr Forrer, was transferred again to the summit, and on the 13th September the location of the line thence to the Lake was commenced.

Between the summit and the forks of the St. Mary's, near the old fort of that name, the line occupies ground of a very favorable character for the construction of a canal. The lockage in this section is considerable, but the surface of the ground is very even and regular in its descent. The line crosses the main east branch of the St. Mary's near its junction with the other branches of that stream. To pass the immediate valley of this stream requires an embankment of 9 to 18 feet in height, and 35 chains in length, and a wooden aqueduct, resting on stone abutments and a pier of 66 feet in length. From this point the line passes down the river on and near its east bank for about two miles;—through about one half of this distance the line is thrown on the immediate margin of the river by high banks which will require cutting down from the top, at some points as much as 18 feet, in order to suit the level of the canal. From the termination of these points the line bears off from the river, and is continued in a northeastwardly direction across the narrow range of country lying between the St. Mary's and the Auglaize rivers, to within about one and a half miles of Amanda on the latter stream. It is then continued in a direction nearly north, on the narrow range of land between the main and little Auglaize rivers, to the main Auglaize at a point about three miles below Blanchard's fork. At this point the line, as located, crosses the river by means of a dam, and is from the low level of the dam, necessarily kept within the high banks of that river to its junction with the Maumee. This necessity increases the difficulties and cost of this part of the line to a very considerable extent. Its situation is such as to render it a fine expensive of water, and unstable in its character. It was determined

to lock down into the river and cross it by means of a dam, for the purpose of obtaining what water it affords at this point. It has since, however, been thought that the water which can be obtained in this way from the river, will not equal what from the situation and character of the line on the level of a dam, would be lost from the canal by extra leakage; and that consequently it will be most advisable to cross the Auglaize upon an aqueduct, the level of which will find a very favorable and water tight line to the Maumee. The objection to this plan is the responsibility of the question of supplying with water, drawn entirely from the summit pound, so great a length of line. Yet it is believed that the whole amount of water which is afforded by the Auglaize river in a time of drought, which cannot be assumed at more than 500 cubic feet per minute, will not exceed the loss of water which must be sustained by locking down into the river with the canal.

The line, for the whole of the distance from the summit to the Maumee river, 72 miles 65 chains, passes through a tract of country unsettled, or nearly so. It is generally heavily timbered and of a character favorable for the retention of water. With an exception of about one mile on the St. Mary's river, it is very flat and uniform in its surface, presenting, if the Auglaize should be crossed on an aqueduct, very few difficulties to the construction of a canal. If it should be crossed by a dam, the line will be thence to Defiance, expensive to construct, and from its situation, liable to waste water. The country generally is very destitute of water, and the line can only be supplied by that which can be thrown to the north through the summit pound. The St. Mary's river below the forks did not pass in September more than 20 cubic feet of water per minute. The Auglaize at Amanda, where it always had been supposed a feeder of some importance might be obtained, did not at the same time pass more than 60 cubic feet per minute—a quantity which would not justify changing the line from its proper course to obtain. The banks of the river at this point are so high that its water could not be introduced into the canal, without sustaining a loss exceeding its amount. A dam was thrown across it at this place, and the whole of its water passed through two 18 inch gauges—on one two inches and on the other three inches in depth.

It is a question of deep interest whether the water which can be thrown into the summit pound will be sufficient for the supply of that level, and the line north of it to the Maumee river. The question stands thus:

From the summit to the foot of the locks at the	<i>miles chains</i>
south end of the upper level.	62 15
From the summit to the Maumee river,	72 65
Total length of canal line,	135 00
	<i>m's ch's</i>
To which add Miami feeder,	10 40
Mad river,	14 60
	25 20
Total canal line and feeders,	160 20
To supply this line with water Mad river	
furnishes, as above shown, per minute,	10,000 cubic f't
Miami, including Musquito creek	2,240
Intermediate small streams, say	500
	12,740

To pass 100 boats per day through the summit pound with locks of 8 feet lift, and of the dimensions of those of the New York canal, will require 1500 cubic feet of water per minute, leaving 11,240 cubic feet for the supply of the evaporation, leakage, absorption, &c. on 160 miles of line, including 25 miles of feeder, or 70 cubic feet per minute for each mile. This, accord-

ing to the estimates made by the board in their report to the last General Assembly, derived from observations and experiments made on different sections of the New York canal, is less than the quantity which will be required for the supply of this length of ordinary line, constructed in the usual manner. But by increased expence and care in the construction of this line, with reference to the saving of water, the board are of opinion that this supply of water may possibly be sufficient. But to secure this result it will be necessary to construct the Mad river feeder and upper level of this line with greater depth, and with some descent to the north. A great proportion of the upper level, and of the feeders will require puddling, which will add considerably to the cost. The circumstance of the greater part of the water being introduced into this line at one end, is an objection to the feasibility of supplying it. To remedy, as far as may be, this difficulty, a considerable current to the north must be given to the water in the summit pound, in order to throw to the north, the water of Mad river. It may be remarked that the line north of the summit is of the most favorable character for the economy of water. It occupies very little sidelying ground; has but one or two considerable embankments, and has generally a tenacious clay bottom. But the summit level, and the line of the two feeders, are of a very different character. For further views on this question, the board refer the General Assembly to the report of Judge Bates, who has examined the line and measured the streams of water relied upon for its supply.

On reaching the Maumee river with the line a short distance below the mouth of the Auglaize, it is proposed to cross that river with the canal, by means of a dam. It is necessary at this point to bring the canal down to a level which will command a supply of water from the river. And as the construction of a dam is necessary to effect this object, and the north bank of the river below, presents fewer difficulties than the south, to the construction of the canal, it was deemed advisable to cross it. On a critical examination of both banks of the river from this point to the foot of the main rapids, it was found that the north or left bank presented fewer and less formidable high banks. These high banks are the chief difficulties which are to be encountered in the construction of a canal down this valley. It is proposed to throw the dam across the river at the head of the second island from Defiance two miles below that point, and to cross the river with the canal boats, about ten chains below the mouth of the Auglaize, passing thence down the north margin of the river, by means of a tow path on the beach, to a point near the dam. From this point the line occupies the immediate margin of the river bottoms, no serious difficulty interposing until it reaches the high bank at Hunter's, ten miles below Defiance. Through a very considerable proportion of the remaining distance between this point and the head of the rapids, the high banks come in contact with the river, and can only be passed by cutting down from their top, the width of the canal, or by building up at low water an embankment or wall, above the extreme height of the floods. Either plan will require considerable expence and care to render the canal permanent and safe in so exposed a situation. The line also in this distance passes the mouths of several creeks, which put into the river, making deep vallies, which must be passed by embankments and large culverts.

It is not impossible that the necessity of constructing a canal along the bank of the river between Defiance and the head of the rapids, which will be difficult and expensive to accomplish, may be superseded by the improvement of the river. With the exception of Flat Rock rapid, five to six miles in extent, and a bar near Girty's point, the river has a very gentle current, and sufficient depth of water for small steam boats. The fall in this section of the river, which is thirty miles in length, is only 18½ feet. The greater part of this fall is on the Flat Rock rapid referred to above. This it is be-

lieved might be overcome by the construction of dams on that part of the river. The bar at Girty's point may be removed without serious difficulty. By the means of sloop locks in these dams, the canal boats may be conveyed on the river by small steam tow boats between Defiance and the head of the main rapids; or tow path banks, adapted to low and high water, may be constructed in the bank of the river, and the canal boat passed on the river by means of horse power. If it should be found on a more critical investigation of this question, that the plan above suggested is a feasible one, a very considerable saving in expence may be effected by its adoption. No substantial objection to its feasibility is now perceived, although a more intimate knowledge of the character of this river, and of the effect of floods, and ice upon its banks, may sufficiently shew the inexpediency of adopting it. The location of the line of canal was made along the bank of the river, and the cost of its construction estimated.

From the head to the foot of the rapids, (Lake level,) a distance of 18 miles, with 62.20 feet fall, a canal may be constructed without any serious difficulty. With the exception of a few bold points of highland, though none of them are wash banks, the situation and character of this line is favorable for the construction of a canal. The hydraulic power which its construction would create will be very considerable, and on the settlement of the country above will become valuable.

The line of location terminates at the Lake level, at a point near the head of the island below the rapids, where four feet water was found.

Stone of good quality for the construction of the locks required in passing the rapids, abounds in convenient situations near the line. But on that part of the line between the summit and the Maumee river, it will be difficult to procure good stone. So far as the general formation and character of the country, and the best information that could be obtained on that subject will shew, there is a great deficiency in this respect.

It is a question of some interest in what manner, and at what point, the canal boat and Lake vessel shall be brought together.

The water is not of sufficient depth up to the foot of the rapids to bring to that point the largest vessels that can come into the bay and river. And the high bluff bank which puts into the river immediately below the foot of the rapids, renders it difficult to continue the canal farther down.

Two plans seemed to present, and to be entitled to consideration: First to construct a tow path along the margin of the river, near the water's edge, to the mouth of Swan creek, nine miles below the rapids, or to such other point short of that, as may be found an eligible site for the great point of transfer of the business from the canal boats to the Lake vessels; or, second, to construct a dam across the river at a narrow point and rock bottom apposite tract No. 581, three miles below the rapids, and by means of a sloop lock in the dam, pass the Lake vessels into the great reservoir or harbor above, and thus carry sufficient water for any vessel navigating the Lake, up to the mouth of the canal.

These are questions of considerable interest, and will require close investigation before a choice between the two plans should be made.

An objection to the first plan is presented in the circumstance that the Territory of Michigan claims boundary to a point above the mouth of Swan creek. Should this claim be sustained there will certainly be an objection on the part of the state of Ohio, to the establishment of the great commercial point, by her own improvement, without the limits of the state. There is also an objection to extending her public works, over which she ought to exercise a control, within the jurisdiction of another government; while the necessity for this can be removed by the construction of the dam above suggested, and thus effectually secure the great commercial point within the limits and jurisdiction of the state, even should the claim of Michigan be sustained.

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY, BY JOHN KILBOURN, AT \$3 A YEAR, IN ADVANCE.

VOL. I. COLUMBUS, OHIO, SATURDAY, AUG. 16, 1828. NO. 9.

Readers will notice that the Canal Documents are continued on the third page of every number, from the last page of the preceding number.

We have before, omitted to notice the commencement of the Chesapeake and Ohio Canal on the fourth of July last. But we intend to herald the peculiarly excellent speech, of President Adams, upon the occasion, when he struck the first spade into the earth, as a commencement of the work.

By referring to the 18th page of this volume, it will however be seen that we there inserted a record of the several gentlemen's names, who were elected President and Directors of said Company.

It is much to be regretted that we are so restricted as to room: as there are numerous notices of works of improvement, and their progress, both of this country, and in Europe, which we wish to lay before our readers; but must forego that satisfaction; until the Ohio Canal Documents are all published—which, however, is not expected before late in the fall; or the beginning of winter.

CANALS.

CHESAPEAKE AND OHIO.

The Chesapeake and Ohio Canal Company have advertised to receive proposals, for the construction of about 20 miles of this canal, commencing at the head of tide water, at Georgetown, D. C. and extending up the Potomac.

PENNSYLVANIA.

In Pennsylvania Internal Improvements are progressing rapidly: 5000 hands are said to be employed on the Pennsylvania Canal; and more laborers are in demand at from 12 to 15 dollars per month.

OHIO.

The Ohio and Miami Canals are advancing steadily. The latter is expected to be completed and in operation this fall. This grand enterprise has thus far equalled, if not exceeded the best expectations of its most sanguine friends, whether in regard of the expense of construction, the utility of the improvement itself, or the amount of revenue arising from it. Forty-two miles only of the Miami Canal are in operation, and on that part of the line too, where, from its contiguity to market, it is

least needed, and of course most used. But on this part of the line, we were told by the collector of tolls at Cincinnati, a few days ago, that the amount received for the quarter ending on the 17th ultimo, for tolls was about \$3000. It should also be taken into the account, that this quarter occupies that part of the year when least produce is taken to market, and when of course the smallest amount of revenue would arise from it.

Western Pioneer.

The State of Pennsylvania is going on with great power and rapidity with her Canal.—About eighty miles of her canal, that is, from Pittsburg to the Northern Turnpike, will be in successful operation, it is believed, in about three months: the residue, about thirty miles, to the Western base of the Allegheny Mountain, will be put under contract on the first of September: and the Rail road over the mountain about thirty-five miles, will be under contract this fall, to be completed the next season. The average number of hands employed this season has been above four thousand, and the disbursements of money eighty or a hundred thousand dollars. The Pennsylvanians have reason to be proud of this great work, which they carry on in the only way in which important public improvements ever can be effected.—*Nat. Int.*

ENGINEERING!

The Lancaster Gazette of the 1st inst. gives the following humorous account of the doings of a parcel of vagabonds, who have made the rigorous measures of Pennsylvania in prosecuting her great works of internal improvement, subservient to villany. The knowledge of human nature displayed in this transaction, will cause a smile even among those who most deeply deprecate imposition.

We have heard of stories being circulated through the county, unfavorable to the manner in which the corps of engineers employed in locating the route for the rail road conduct their operations. It has been stated that fences have been thrown down, grain wantonly injured, &c.—On the one hand we were perfectly satisfied that the gentlemen belonging to the corps were incapable of the conduct attributed to them, and on the other that our citizens could not have originated such complaints without some foundation. It is now proved that we were right in both opinions.—A man named Walker, well known as an occasional occupant of our jail, made his escape some months since from confinement, but with a hardihood not uncommon with those who are lost to all sense of shame, took up his quarters within a few miles of the city, and with the aid of two vagabonds like himself,

formed an independent corps of engineers, furnished themselves with a few poles, and a line, and commenced running a route of their own, making it a point to arrive near a good farm house a little before breakfast or dinner, fix up their poles on one side of the garden, or orchard, or barn yard and a second at a distance on the other side; as soon as this was done a great bawling and noise was made by one of these travellers who would cry out—*lower—a little lower—higher, &c.* until the bellowing brought out the whole family—when lo! there were the engineers, laying out a road in the very track that would do the most injury. The alarmed farmer expostulates—wonders if they could not go a little way round to save his garden—his orchard—his spring house, or his barn yard—inquires if they have breakfasted—or dined—or would drink something—the weather was parching hot. The gentlemen, when well treated, were willing to accommodate, and would try another course, but if the farmer was grumbly it was nothing but dash through the cabbage bed—down with the fences—thrash down the grain to let them see the mark upon the pole—and *higher! higher! a little lower!* was roared out as before, until the farmer obtained a suspension of hostilities by an invitation, to eat or drink, and then the accommodating engineers moved on to make another exploration. Walker, the chief of this corps, has explored his way into the criminal apartment, and the chain carriers and target men are dismissed the service.

After this discovery we need not expect to hear any complaints of the gentlemen belonging to major Wilson's company who have always conducted themselves in a manner that has secured the most friendly and kind treatment from the inhabitants.

Pennsylvania Paper.

The following is an extract of an order from the Engineer Department, dated Washington City, 1st Aug. inst.

Captain T. W. Maurice, Erie, Pennsylvania, is charged with the direction of the following civil constructions, viz: erection of works for deepening the channel of entrance into the harbor of Presque Isle, Pennsylvania; for the improvement of the harbors of Buffalo, Dunkirk, and Oswego, New York; of Cleveland harbor, Ohio, and of La Plaisance Bay, Michigan; for the removal of obstructions at the mouths of Ashtabula and Cunningham Creeks, and Grand, Huron, and Black Rivers, Ohio; making surveys of Genesee River and harbor, of the mouth of Sandy Creek, and examination of the Southern shore of Lake Ontario, between Genesee and Oswego Rivers New York.

LOWELL, (MASS.) JULY 25.

There are now seven mills in operation in this town, in which are manufactured, weekly, over one hundred and twenty five thousand yards of cotton cloth. At Mr Hurd's mills are weekly manufactured about three thousand yards of cassimere. Two other mills for the manufacture of cotton cloth are now ready to receive the machinery when completed, and two more are now being erected, besides a very large building for a carpet factory.

The Virginia Internal Improvement Convention, which lately met at Charlottesville, and of which James Madison was president, close their memorial as follows:

"Bearing, in any system of Internal Improvement, the relation of the great avenues of trade, which the daily offices of social feeling have to the public virtues, a good system of common roads makes up, in the frequency of its use, what it may seem to want, to superficial observers, in dignity. In a comprehensive system of Improvement, the General Assembly will assign to a just and effectual provision for the country roads, rank proportioned to the enjoyments which it dispenses, and thus heal one source of dissatisfaction in a Commonwealth, which has, in truth, but one interest, that of diffusing, every where, the spirit of social contentment."

The Convention sat on six successive days, and adjourned on Saturday the 19th ult.

The Greensburg, Pennsylvania Gazette, says—"The contractors along the Conamang and Kiskeminnetas, from Leech's dam to Blairsville, are in immediate want of two or three thousand hands and mechanics. Every man who wishes to work on the canal, or to command ready money for his labor, is invited immediately to the canal."

CANAL LEVELING INSTRUMENTS.

The subscriber manufactures and keeps constantly on hand the above Instruments, at his establishment in Gibbonsville, opposite Troy, N. Y. Also, small Spirit Levels, with sights; suitable for Mill-wrights, &c.; all kinds of Surveyors' Compasses, Chains, &c.

P. S. Orders directed to the subscriber, at Gibbonsville, Albany county, N. Y. will be thankfully received and meet prompt attention.

Eight best SPIRIT LEVELS, now on hand with two feet Telescope, which he offers for sale on the most liberal terms.

July 31. ANDREW MENEELY.

NOTICE

Is hereby given to all whom it may concern, that application will be made to the Legislature of Ohio, at their next session, for a law to incorporate a company for the purpose of constructing a Rail Road from the navigable feeder at Columbus to the navigable feeder on Mad river of the Ohio and Miami Canals.—Also, to construct a rail road from some point on Lake Erie, near the Sandusky bay, so as to intersect the National Turnpike road east of Mad-river.—*Mad-river Courant.*

July 26th 1823.

OHIO MAPS.

The editor of this paper has just revised his Maps of the state of Ohio.—one large, upon the scale of 10 miles to an inch;—the other small, being drawn upon a scale of 40 miles to the inch; so that it is but little more than six inches square. It is beautifully engraved, and printed on bank note paper. Price 18 cents; or 12 cents if several are taken together.—Price of the larger ones \$1 50 each; or one dollar if several are purchased together. The canal routes are correctly delineated on both.

Soundings were taken of the Maumee river and bay from the foot of the rapids to Turtle island, off the north cape of the bay. At the point where it is proposed to erect the dam suggested, there is rock bottom, with $6\frac{1}{2}$ feet water. The length of the dam will be $13\frac{1}{2}$ chains and its height, above the surface of the water, four feet. Below this rock the water increases in a short distance to 8 and 9 feet depth. At a point between that and Swan creek, a mile above Grassy point, about 8 feet water was found, and on the bar in the bay, 8.25 to 9 feet. This will admit vessels which can pass the bar in the bay, with but little difficulty, to the proposed dam, and by means of a lock, up to the mouth of the canal.

The following statement will exhibit, at one view, the total length of the Maumee and Miami route, together with the amount of lockage, and the estimated cost of its construction.

The distance from the summit to the foot of the rapids	<i>miles chains</i>
of the Maumee, as located is,	119 56
From the summit to the Ohio river at Cincinnati,	145 66
Total length of main line,	265 42

	<i>miles chains</i>
To this add Miami feeder,	10 40
Mad river,	14 60
	<hr/>
	25 20

Aggregate length of canal line and feeder	290 62
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Lockage from the Ohio river at Cincinnati to the junction of the Miami feeder with the canal line, near Abner Enoch's mill one mile above Middletown,

	215.00 feet
Thence to the Mad river near Dayton,	9 .00
Thence to the summit level,	203.40

Total lockage descending south from Loramies summit,	511.40
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Lockage from the summit to the Maumee river near the mouth of the Auglaize river,

	280 feet
Thence to the foot of the rapids at the village of Maumee	98

Total lockage, north, from the summit,	378.00
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Whole amount of lockage on this route,	889.40
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Expende of constructing canal on this route:

From the Ohio river to the Miami river at Abner Enoch's mill above Middletown,

	\$381,140
From Abner Enoch's mill to the crossing of Mad river near Dayton,	185,697

From the crossing of Mad river to south end of deep cut at Loramies summit,	846,973
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From south end of Loramies summit to the crossing of the Maumee below Fort Defiance,	682,309
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From the crossing of Maumee to the foot of the lower rapids,	406,375
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Total expence of main line on this route,	\$2,502,494
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FEEDERS:

From Mad river to the summit level,	\$341,369	
From Mad river to the level below the locks at Jackson's creek including dams,	12,978	
From Great Miami to summit level,	73,125	
		<hr/>
Total expence of feeders added,		427,463
		<hr/>
Total expence of canal and feeders on this route,		\$2,929,957

NOTE—It is proposed to construct temporary wooden locks from the Loramie's summit, north, to the vicinity of the crossing of Auglaize, a total descent of 197 feet, on account of the difficulty of procuring stone; and the expence has been estimated on this plan.

These estimates on the cost of the Maumee and Miami route are predicated upon the principle of constructing a canal in the ordinary manner. By a reference to a former part of our report in relation to this route it will be seen that the whole quantity of water, which can be thrown into that part of the line, extending from Mad river to Maumee, is less than the estimated expenditure on the same length of canal line constructed in the usual method and that it will be necessary to incur an additional expence, in order to render impervious those parts of the line, which from their situation, or the quality of the soil are exposed to leak. This extra expence, from the nature of the work cannot be calculated with accuracy—but it will probably amount to a sum between \$200,000 and 300,000, which must be added to the amount of the above estimate. To this aggregate is also to be added ten per cent. to cover expence of superintending and unforeseen contingencies, as on the Muskingum and Scioto route.

It is proposed to make the canals of the same dimensions, as those of the Erie canal in New York, with locks of the same capacity; and all our estimates not otherwise designated, are calculated on that basis.

Tymochtee Summit.

In obedience to the act of the last General Assembly, the board has caused a full examination on the subject of supplying the Tymochtee summit with water, to be made by a skilful and experienced engineer, David S. Bates, Esq. on whose investigations and opinion in relation to that question, the board feels the highest confidence. By these examinations the opinion expressed in our report to the last General Assembly is strengthened and confirmed.

The head waters of the Great Miami, which are susceptible of being thrown into the Scioto, together with the main and Little Scioto—the Sandusky, Broken Sword and both branches of the Whetstone, at points from whence those streams can be conducted to the summit have all been gauged by Judge Bates during the past season. The small lakes at the head of Rush creek, Mad river and Buckingelas, as well as other places for forming reservoirs to aid in the supply of that summit have also been examined. The results of these examinations and measurements, together with the calculations and opinions of the engineer, predicated upon them, will be laid before the General Assembly. Most of the streams in the vicinity of the Tymochtee summit and the head waters of the Great Miami, were found much less than they were when gauged in 1823. Mad river which was measured at a point eight miles lower down the stream was found much larger, which is attributable to the important accessions of water which it receives between the two places where it was measured. The result of the measurements of Mad and Miami rivers, made during the last season, is given in a preceding part of the report.

Several experiments have been made during the last summer to determine the actual expenditure of water on the Erie canal in New York. These experiments are of the most satisfactory nature, and the result corresponds with that of the experiments made in the fall of 1823, as communicated in our last report. About twenty miles of the Erie canal, extending from Rochester to Brockport, was completed and filled with water in October, 1823—and has been navigated during the remainder of the last and the whole of the present season. On this section of canal there are no locks; it occupies but one level, and until the twentieth of August last, was closed at its western end at Brockport, and was supplied with water from the Genesee river, which passes over the aqueduct at Rochester. At this place where the quantity of water passing in any given time could be measured with the greatest accuracy, it was carefully estimated, at three different times by Judge Bates about the middle of August and at each time it was found to vary very little from 2100 cubic feet per minute. This quantity was therefore expended each minute on the section of canal above described by leakage, soakage and evaporation, none being required for lockage. From this statement it appears that the average expenditure on each mile of this section of line exceeds 100 cubic feet per minute. This may be considered as a fair sample of canal line, as it relates to the expenditure of water. Most of it is located through a level country possessing a solid tenacious soil, a small part of it is more porous, but none of it is very leaky.

It may be laid down as a general rule that a canal located on ground of the usual character, and constructed with ordinary care, will expend in our climate 100 cubic feet of water per minute for each mile of canal, besides the water required for locks. Where the soil is remarkably tenacious, or unusual care is taken in making the canal tight, a less quantity may suffice; but it would be unsafe to calculate, that an expenditure of less than 70 cubic feet per minute for each mile would be required, on the most favorable section, of any considerable extent, which could be located on either of the proposed routes through this state, or on one constructed with the greatest care.

In relation to the question of supplying the Tymochtee summit with water brought from the Mad and Miami rivers, it will be observed, that in our report to the last General Assembly, the length of that part of the feeder extending from Mad river to the Loramies summit was estimated at fifty miles. This on actual location is found to exceed 75 miles, and occupies ground more rough and unfavorable than was anticipated. The length of the feeder from the Miami to intersect the Mad river feeder, is found, on location, to be $10\frac{1}{2}$ miles as heretofore stated; and if the length of the line from the Loramies to the Tymochtee summit is increased beyond our calculations in the same proportion as the line from Mad river to Loramies, by an actual location, the distance between these two summits will be 150 miles. But supposing it only 115 miles, the total length of line to be supplied from the Mad and Miami rivers, on this plan will be as follows:

Located line from Mad river to Loramies summit,	75 miles
do. do. from Great Miami to intersection of Mad river feeder,	$10\frac{1}{2}$
Estimated distance from Loramies summit to Tymochtee,	115
Upper levels on main line of Sandusky and Scioto route,	50
	<hr/>
	$250\frac{1}{2}$

To supply this length of line upon the lowest estimate of expenditure will require 17,535 cubic feet of water per minute, reckoning nothing for lockage water. The whole quantity of water which can be thrown into this line agreeably to the statement made in reference to the Maumee and Miami route is 12,740 cubic feet, leaving a deficiency of 4795 cubic feet per minute.

The waters of the Scioto, Sandusky and Whetstone are not taken into the above account; for those streams at points sufficiently elevated to admit of their being taken to the summit, are so small that the water would probably all be expended before it could reach the canal.

The supplying of so long a line of canal as that above stated, with water introduced entirely at, or near one end, has never been sanctioned by experience or even attempted, within our knowledge. The expence and hazard would be great were the source of supply ever so abundant; but the great inadequacy of the supply removes all doubt, and forbids the undertaking.

As the result of our examinations proves, that there cannot be water enough conveyed to the Tymochtee summit to supply the waste occasioned by leakage, soakage and evaporation, it is unnecessary to inquire into the saving of leakage water which may be made by introducing moveable locks or inclined planes instead of fixed locks of the ordinary kind.

From a careful and minute examination of the country and of the streams concerned in this question, combined with the most accurate information which the board have been able to obtain on the subject of supplying canals with water, we are fully of opinion that the upper levels of the proposed Sandusky and Scioto route cannot be supplied with water, in dry seasons, by any other means than that of constructing an extensive artificial reservoir on the summit.

Nature has presented us with no safe and convenient place for the formation of such a reservoir in the vicinity of the summit; and to answer the end proposed, this deficiency must be supplied by art. The construction of a reservoir, entirely artificial, of sufficient capacity to effect the object in view, must necessarily be attended with great expence in its construction, and subject to hazard and accidents of the most serious consequences, when made. And it must be deemed a violation of the dictates of sound discretion and prudence, to undertake the construction of a canal on a route dependent for its supply of water, on an expedient attended with certain and great expence, but of doubtful efficacy, unsanctioned by experience, when other routes are presented for our adoption which are thought equally important to the interests of the state, and free from the same embarrassing difficulties.

A more detailed statement of the examinations and calculations in relation to the Tymochtee summit, will be laid before the General Assembly in the report of Judge Bates herewith transmitted.

The commissioners from a full view of the subject, and an examination of the estimates, which will be laid before the General Assembly, are of opinion, that it is practicable to make canals, from the Lake to the Ohio river, upon two of the routes which have been surveyed; one commencing at the mouth of the Scioto river, and passing by the Licking summit and the Muskingum river to Lake Erie. And the other from Cincinnati to the foot of the Rapids of the Maumee river; both of which, are of unquestionable importance, and ought to be made by the state, as soon as the necessary funds can be obtained and the wants of the people require them.

They recommend therefore the passage of a law authorizing the construction of the first mentioned line of canal, and so much of the second, as extends from Cincinnati to Dayton; and providing necessary funds therefor: leaving it to succeeding Legislatures, to determine when it will be expedient, to complete the western line, to the foot of the Maumee rapids.

Were the resources of the state adequate to the present construction of both canals it might be expedient to undertake them at the same time. But while we believe that the resources of the state are fully adequate to the construction of one entire route, we deem it highly impolitic to undertake both at once. Such an undertaking would not only subject the people of the state, to burthens greater than they would cheerfully bear, but it could

hardly fail to injure the credit of the state abroad by inducing capitalists to believe that we were attempting exertions beyond our strength, and that our councils were not governed by sound discretion.

If then it is imprudent to undertake the construction of two entire lines of canal from the Lake to the Ohio river, at the same time the question recurs—which line shall be first constructed?

In settling this important question, we are aware that local feelings and sectional interests will arise, and interpose their influence in a greater or less degree. If these feelings and interests are suffered to govern, no favorable result can be expected. In all states or communities, whether great or small, many improvements are suggested which require the joint exertions of all. If all these improvements must be accomplished at once, or not all the inevitable consequence would frequently be, that nothing could be done, the strength of the state being inadequate to the simultaneous construction of so many works. It then becomes indispensibly necessary to the progress of improvement, that in many cases the interest of one section of the country or class of society be postponed to those of another. In all those cases, those improvements which interest the greatest proportion of the community, which will be the most extensively useful, in proportion to the difficulty of their attainment, and for which there is the most urgent necessity, should be first accomplished.

In reference to the question under consideration it will be observed, that the Muskingum and Scioto route passes through the state, nearer the centre, and so as to divide its territory much more equally than the Maumee and Miami route; and will therefore accommodate a much greater proportion of its area and population.

Difficulties in transporting the surplus productions of the soil to market exist in the Muskingum and Scioto vallies, to as great a degree as in the Miami country. And the advantages which will be derived to the people of the state from the proposed canal on either route, will be in proportion to the extent and productiveness of the country accommodated.

All that part of the Maumee and Miami route, which is north of the Laramies summit, is with few and inconsiderable exceptions, located through a wilderness, where the present construction of a canal, will be attended with greater expence, than in the same country after it becomes thickly inhabited, and can furnish on the spot every thing necessary in the prosecution of the work.

There is one other consideration which has much weight in the decision of this question. The great length of line on the western route, which must be supplied with water introduced entirely near and mostly at one end, presents a question of greater difficulty than any which occurs on the other route. Great skill and experience will be required in the construction of this part of the canal, and any error or want of the requisite knowledge and care might be attended with the most serious consequences. Besides, it would be necessary to encounter a heavy expenditure of money before this part of the line could be useful or profitable; as no part of the line between the Laramies summit and Maumee could be used, until the whole line from that summit to Mad river, and that the expensive feeders from that stream and the Great Miami should have been completed.

The Muskingum and Scioto route throughout its whole extent is located through a well peopled country which can furnish in abundance every thing required in the construction of a canal. No very great extent of line which will require its supply of water entirely from one source any where occurs. All the questions involved in making a canal on this route have been settled by experience; and when the knowledge which will have been derived from the construction of a canal on this route shall be in the possession of the state,

the difficulties which occur on the western route, can be encountered with much greater safety.

In recommending the immediate construction of so much of the western or Maumee and Miami route as extends from Mad river to the Ohio, the board have been influenced by a consideration of its cheapness when compared with the summit level or northern part of that route—the ease and certainty with which it can be supplied with water—the population and productiveness of the country through which it passes—the present accommodation which it will give—and the certainty which it promises of profit to the state immediately after its completion.

These reasons, together with others which will suggest themselves to the mind of every reflecting man, and which it is unnecessary for us here to detail, have induced the board to recommend to the General Assembly the course above proposed.

The advantages which will result to the people of this state, from constructing the proposed canals; are of two kinds; neither of which admit of accurate, and certain calculation. considered as objects of revenue, as a profitable investment of capital, their value and importance, can be estimated by comparison with similar works, in our own, and in other countries. The Middlesex canal, which connects the Merimack river with Boston harbor, and which is principally used for the transportation of lumber, has not given to the company owning it, more than three per cent. interest on the capital expended in its construction. The New York canals were expected by their projectors, to yield a revenue, sufficient to pay both the interest and principal of their cost, within a few years after their completion; and it is understood that the receipt of tolls, has been even greater than was anticipated. We have not the means of ascertaining the revenue derived from canals, in any foreign country, except England, where canals are made and owned by private companies, and the value of canal stocks, like the other stocks in market, are regulated by the annual nett profits of them; we there find, that a clear nett revenue, of more than ten per cent. per annum, is obtained by the owners of such stock upon their actual cost; we might in truth safely estimate the average profit of the canals of England, higher than ten per cent. for although some few of them fall short of, many more very far exceed that amount. But England is fully peopled, and the wealth, enterprise and industry of her inhabitants, are in constant activity—her canals therefore must do more business, and yield a greater profit, than could be reasonably expected in a country thinly peopled, and without manufactures; yet when we consider the vast extent of country, which will be connected by a navigable canal from Lake Erie to the Ohio river, already in part covered by a numerous and active population and over the residue of which, “the nation is journeying on, like a healthy giant, with a pace more like romance than reality,” we may be assured that in a few years, one channel of communication, must be fully occupied; and consequently yield a revenue, much beyond the ordinary profits upon other stock. Viewing the proposed works then as mere money speculations, we are warranted by the experience of our own and other countries, and by that increase of population, wealth and industry which is apparent to all, in concluding that it would be a prudent investment of capital. We briefly allude to this view of the subject, without going into any detail of estimates upon the probable amount of tonnage, or number of passengers, which at any given period, may pass by the proposed routes; because, although such estimates, would be of primary interest to engage private capital in the undertaking, they dwindle into comparative insignificance, when a powerful state is contemplating the best means of promoting its permanent welfare.

A more important and interesting inquiry, is, what are the advantages, which the people of this state may derive, from the construction of navigable canals upon the routes proposed, other than the revenue to be collected? They will raise the value of land, a considerable distance upon each side of them. Proximity to navigable waters is in all countries, a reason why lands so situated, are higher in value; more desire the possession of such, than of those remote, not merely because the quality of the soil is superior, but for the facilities of transportation to other places, which a convenient navigation offers. The morasses of Holland, would not have been drained and embanked, for any superior quality in the soil, if the Rhine and its branches, had not offered to the produce of that soil, the means of easy transportation, to an extensive interior, and to foreign countries. The swamps of the Mississippi, will be reclaimed and covered by an industrious population, long before the swamps of the interior parts of the country, will be worth draining. Wherever man has settled down in communities, employed in agriculture and the arts, the materials of exchange, the basis of commerce have been created, and the natural facilities of water communication, have been seized upon and improved; so that in all times the densest population, the wealthiest and most industrious people, have been found upon the borders of navigable waters; and there is reason to suspect, that those travellers, who have represented the population of China, as so numerous, have been misled into estimates excessive and romantic, by what they saw, upon the borders of their great canal; without considering that the cause of such a congregation of human beings, upon that route, did not extend and could not produce the same effect throughout the whole empire. The same cause must produce the same effect here that it has done in other parts of the world; it is therefore we presume, that a still water navigation through the state, will draw to its neighborhood a dense and industrious population; enhancing the value, by the increased demand for them, of all the lands in its vicinity, to as great an extent, as it shall offer additional facilities to the transportation of the products of industry. How great this extent will be, it is not easy to estimate with certainty, but assuming that for a distance of ten miles, upon each side of a canal, the land, will be enhanced in value, \$1 00 per acre; then, each one hundred miles of canal, will raise the value of the lands upon its borders one million two hundred and eighty thousand dollars; a sum more than sufficient to make it for that distance. If it is supposed that this advantage will be one to the owners of those lands exclusively, and not to the state at large; it may be observed, that whatever adds to the permanent wealth of any part, adds to the wealth of the whole state; for the state being but an aggregate of individuals its wealth is nothing more than the aggregate wealth of those individuals. This wealth will not exist in the state treasury, but it will form a capital, upon which by an equal and just mode of taxation, the state can at all times draw into that treasury an adequate supply for any wants of a wise and prudent government; beside the surveys and examinations which have been made by the liberal foresight of the Legislature have established the important fact, that canals may be made through so many parts of the state, as to communicate to all the advantages of them. The proposed routes therefore, instead of being confined in their benefits to the sections of country through which they are proposed to be made, ought to be considered as the commencement of a system of internal improvement interesting to the whole, and which when completed, shall by means of canals and good roads, give to every part of the state the greatest facilities of communication which art, under the direction of a wise government, can create.

In this view of the subject, the length of the proposed canals, can be no objection to them. A private company incorporated to construct a navigable canal from Lake Erie to the Ohio river, would have many inducements

to select the shortest route; but the General Assembly seeking to promote the interest of the community, will see that object accomplished, in whatever will increase the population, industry and wealth of the state. The extension of canals to every part of the state, where it may be useful and practicable to construct them, is therefore a measure of the soundest policy; and the state, instead of being impoverished, by contracting debts, for such purpose, would be enriched, if no tolls were ever to be collected upon them — The facts, to support this position, are numerous and well authenticated; they are also well known to almost every person whose attention has been drawn to the subject. But there is another point of view, in which the wisdom of commencing a system of internal improvement, will press itself upon the minds of enlightened legislators with irresistible force; it regards the future. Not one half of the forty thousand square miles of our territory is yet settled; more than five sixths of it remains uncleared and uncultivated; and yet, such has been the unexampled rapidity of increase, that we have reason to believe the next census of our people will exceed a million. It may exceed four millions, before all those who are now assembled to legislate for the happiness of this rising commonwealth shall have passed away; if the means in our power are used with skilful economy, to provide for the convenient and profitable exertion of the enterprise and industry of such a population. By providing in season, an easy and pleasant intercommunication throughout our own territory, and opening for the fruits of that enterprise and industry a cheap and safe avenue to distant markets. Upon works, then, which are made not merely for the present, but for future generations, it is fair and rational to estimate their utility, not to us only, but to those who are to follow us: to a people more numerous than were those of the whole American confederacy at the commencement of the revolution. If therefore, the proposed system of improvement would be useful and profitable to the state were it now completed; its use and profit cannot diminish, but must increase with time; remaining a splendid monument to our posterity of the power and wisdom of its founders: as durable and incomparably more useful than the ponderous or elegant structures of Egyptian or Grecian magnificence.

An important question may present itself for the consideration of the General Assembly, as connected with the proposed improvements; whether the contemplated canals should be made under the authority, and at the expence of the state, or charters should be granted to private companies for that purpose? The commissioners are of opinion, that the work should be undertaken by the state; chartered companies, possessing exclusive privileges, have always been popular in monarchical governments, because their powers and advantages were so much carved out of the sovereign power for the benefit of subjects—so much in fact gained from the monarchy. The judicial tribunals, influenced doubtless by the popular feeling upon this subject soon found means to secure them to the grantees—gave them a character of *immortality*; changed granted privileges, from the sovereign, into a contract between equals, and placed them beyond the reach of his power, under the protection of that ingenious fiction. Our jurisprudence which borrows its principles and reasonings from England, has very gravely adopted this doctrine of immortality in corporations: naturalized and established it as law in our free governments, and stretched over its dogmas, the ægis of the constitution, so that in effect, whatever is granted to a private company by the Legislature is holden to be intangible and irrevocable. A grant made under erroneous impressions, and which in its operation is found detrimental to, or even destructive of the public welfare, whether it involves the exercise of sovereign powers or not is, according to established principles of law, altogether irrevocable. The present generation may in this way not only bind themselves, but their posterity forever; and government, instead of being at all

times administered for the benefit of the people and in accordance with their will; may be parcell'd out into monopolies, swallowing up their interests and counteracting their wishes. How long a free people will sanction such principles, or how consonant they are to the fundamental maxims of our social fabric, it is not our purpose to inquire; the existence of them, we remark, as evincing the risk and danger of granting to private companies any control over matters of public and general interest. Nothing can be more interesting to the whole community, than great navigable highways through the state, from the Lake to the Ohio river, on the routes proposed; it does not consist with the dignity, the interest or the convenience of the state, that a private company of citizens or foreigners, (as may happen,) should have the management and control of them; the evils of such management cannot be fully foreseen, and therefore cannot be provided against; for experience is the only safe guide in legislation and of the operation of such grants we have no experience. Besides, such works should be constructed with a view to the greatest possible accommodation of our citizens; as a public concern, the public convenience is the paramount object; a private company will look only to the best means of increasing their profits, the public convenience will be regarded only as it is subservient to their emolument. We think therefore, that it would be extremely hazardous and unwise, to entrust private companies with making those canals, which can be made by the state. But, when the public interest requires the making a canal, and the location of it is such, as that the state cannot be the owner of it, it will be necessary to incorporate a private company for that purpose; thus, in our last annual report to the General Assembly, the incorporation of a company to make a canal by the Big Beaver and Mahoning was recommended; for as this line of canal cannot be completed within the territorial jurisdiction of this state, but must necessarily pass about thirty miles within the commonwealth of Pennsylvania, the commissioners saw no practicable method by which it could be made by the state.

By our report to the last General Assembly, it was seen, that sufficient funds might be obtained upon loan and on favorable terms, for the purpose of constructing a canal; and subsequent information has fully confirmed the favorable conclusions then made upon this subject. For the commencement and completion of these works, it is believed that the state must necessarily borrow all or nearly all the sums wanted. The history of government debts is not likely to make very strong impressions in their favor, for with few exceptions, they have usually been contracted for objects totally adverse to the best interests of society. A public debt is, doubtless, a great evil to any state upon which it may be imposed, if the money obtained by contracting it has been wasted; but societies as well as individuals may wisely contract debts, and leave them a charge upon their posterity, if they leave to that posterity in the estates purchased, or improvements made by the moneys so procured, an ample patrimony to discharge them. Such it is believed would be the case with a debt contracted for the purpose of making the proposed canals; for with a prudent and economical expenditure in making them, the capital vested will be worth more when they shall be completed, even as merchantable stock, than they will have cost; and will increase in value while the population, wealth and business, not of this state only, but of the immense regions made accessible to each other by them, shall continue to increase. A debt therefore contracted for such purposes, cannot be objectionable, if the state possess the ability to pay the interest of it.

It will not be expedient to borrow the whole sum which may be wanted, previous to commencing the work, but only so much annually as can be advantageously applied within the year; and this is estimated by the commissioners to be four hundred thousand dollars, for the first year, and six hun-

dred thousand for each succeeding year, until the canals are finished. To secure the regular payment of interest upon these sums, sufficient revenue must be provided. If the General Assembly should think it advisable, to appropriate the land tax for this purpose, and the present system of taxation be continued, it will be sufficient to pay the whole of such interest, besides defraying the expences of the state government, with the aid of such tolls as may be collected upon sections of canal from time to time completed; provided the land tax is raised to its amount in the year eighteen hundred and twenty-three.

But the present system of taxation, although adequate to the support of government, and although it may afford a surplus applicable to other objects, is extremely unequal and of course inequitable in its operation. It is unequal as a tax upon land, because land worth fifty cents or a dollar per acre, is charged from twenty to an hundred fold more, in proportion to its value than land which is worth twenty dollars and upwards; and this inequality cannot be remedied by the present system, without increasing the rates of land, and devising some plan which will secure the correct entry of all lands upon the tax lists. If the position be admitted, that the necessary expences of the state, should be contributed by all the citizens in proportion to their property; then the land tax, as an exclusive source of revenue, is still more unequal and oppressive, in as much as it leaves exonerated from the burden of taxation a great and increasing mass of personal property; property too, from which in general a greater profit is derived by its owners, and consequently a greater ability to share the public burdens. If these views are correct, a total change of our system of taxation ought to be effected, and no time can be more auspicious than the present for such change; for while the Legislature are devising measures which are calculated and intended to promote the public welfare, and happiness of not only the present, but of future ages, it seems eminently proper that the ways and means of carrying those measures into effect, in the most equal and just manner, should at the same time, be considered and adopted. The commissioners therefore respectfully recommend, that provision be made by law for forming a general list of all property which may be charged with taxes upon the following principles, to wit: All lands the property of individuals or of corporate companies which are not exempted by law from taxation, to be appraised at their cash value, taking into view the quality of soil and local situation, without including any other improvements than dwelling houses of more than two hundred dollars value, and to be placed upon such list at such appraised value. Also all town lots with the buildings on them, but without including other improvements.

That domestic animals be placed upon such list at some specific sum per head. That mercantile capital be classed and placed upon such list according to the just amount thereof employed. That professional men be rated at some specific sum, or be classed and placed upon such list at such sum as they may be rated or classed. And that all taxes for state, county, township or corporation purposes, be assessed by a per centage on such list. The Legislature to determine, from time to time, the amount necessary to be collected for state purposes.

As connected with the subject of revenue, it may be suggested, that by an ordinance made by the convention, which framed the constitution of this state, "every and each tract of land sold or to be sold by Congress from and after the thirtieth day of June, 1802," was "exempt from any tax laid by order or under the authority of this state for the term of five years after the day of sale." At the time when this ordinance was passed, the government of the United States were disposing of their lands upon credit; and this regulation was adopted at their instance, and was beneficial to them, inasmuch as it fa-

facilitated their sales, and prevented any embarrassment by charges upon lands which might revert. The cause and reasons of this agreement have ceased since the government of the United States have ceased to sell their lands upon credit; and it is no longer of any use or advantage to them; it is therefore believed, that Congress would without hesitation agree to rescind that agreement, if requested to do it by the General Assembly; the propriety and expediency of making such request is therefore submitted.

The following statement will exhibit the probable revenue which may be derived from the proposed canals, during the progress of the work and after their completion.

So soon as that part of the line extending from the Miami above Middletown to the Ohio, shall have been completed, which will be in three years from the commencement of the work, an extensive and valuable water power at the southern termination of the canal in Cincinnati, where that power is much needed, and will be as valuable as at any other place, will be at the disposal of the state.

This power may be estimated as follows: Any quantity of water which can be permitted to pass in the canal without injury to its banks or to its navigation, may be taken into the canal at Middletown. From a close calculation it is thought safe to introduce 8000 cubic feet per minute. Admitting 4400 cubic feet per minute of this quantity to be expended on the 44 miles of canal between Middletown and Cincinnati, equal to 100 cubic feet per minute for each mile, and 600 cubic feet per minute to be used in locking boats from the Ohio river into the canal, and from the canal into the river, which will be sufficient to pass 80 boats per day, there will remain a surplus of 3000 cubic feet per minute, applicable to hydraulic purposes at Cincinnati. The descent from the proposed basin, on the upper plane at Cincinnati, to high water mark in the Ohio, is 50 feet, and to low water mark 108 feet. This water may therefore be applied on three overshot water wheels of 15 feet diameter each, in succession, before it reaches the level of high water mark. It has been ascertained by actual experiment, that 300 cubic feet of water per minute, if applied to the best advantage, on an overshot wheel of 15 feet will give power sufficient to keep in operation two pairs of $4\frac{1}{2}$ feet mill stones. Calculating from this datum, 20 pairs of mill stones could be driven on the first descent of $16\frac{1}{2}$ feet of the surplus water from the basin, the same number on the second descent, and the like number on the third descent of $16\frac{1}{2}$ feet; in all, power sufficient to keep in operation 60 pairs of mill stones, in the descent of the surplus water from the basin to the level of high water mark. Two hundred and fifty dollars would certainly be a moderate rent for water power sufficient to drive a pair of mill stones, or the same power applicable to any other machinery, in such a place as Cincinnati; especially when it is considered that the power would be constant, not subject to interruption from high or low water. At this rate the water power from the basin, to high water mark in the Ohio, would rent for 15,000 dollars per annum. And this rate is much lower than that for which water power is rented at other places. The power obtained by descent from high water to low water mark, would not be as valuable as that above estimated; as it would be subject to occasional interruptions from high water. These interruptions on the upper half of the descent from extreme high water mark would seldom occur; and it will be safe to estimate the rent of water power from high to lower water mark, at 5000 dollars per annum; making the total amount of water rents 20,000 dollars per annum. Much water power may also be obtained in the descent between Middletown and Cincinnati, which is 107 feet.

The amount of tolls arising from transportation on the canal extending from Dayton to Cincinnati, it is not so easy to estimate. The following, however is the most correct view we are able to give of the subject.

It is ascertained from information, on which the utmost reliance can be placed, that 30,000 barrels of flour have been exported, from the county of Montgomery alone, in one year. It will undoubtedly be safe to estimate that the same quantity will be exported when additional facilities are offered by the canal for exportation; and that at least an equal quantity will be exported from the counties of Clark, Champaign, Miami, Dark and other adjoining counties. The lowest price for which flour can now be transported from Dayton to Cincinnati, is fifty cents per barrel. A toll of $12\frac{1}{2}$ cents per barrel from Dayton to Cincinnati, will not be unreasonable, and this on 60,000 barrels will give a revenue of 7,500. On all other articles transported from Dayton to Cincinnati on the canal, it will undoubtedly be safe to calculate on receiving a toll of \$2,500 per annum, making on the descending navigation from Dayton an aggregate of 10,000 dollars. From the business which will naturally fall into the canal from the intermediate counties of Warren, Butler and those adjoining them, together with the whole ascending navigation, it will be safe to calculate on receiving an equal amount of toll; making a total product from tolls of 20,000 dollars per annum, which added to the estimated rents for water power, will produce the annual sum of \$40,000.

It is much more difficult to form a probable conjecture of the amount of tolls which may be derived from the canal on the Muskingum and Scioto route, during the different stages of its progress, or even after its completion. When 50 miles, extending from Lake Erie into the interior shall have been completed, it is probable, calculating from the best data in our possession, that 30,000 barrels of flour and 20,000 barrels of whisky, pork, ashes and other articles will be transported on it to the Lake, from which 6,250 dollars toll may be derived; and that 2,500 tons of salt, merchandize and other articles will ascend, from which a toll of 3,750 dollars may be derived; making in all 10,000 dollars of tolls. It is supposed that the two counties of Stark and Wayne will be able to export, in the fall of the present, and spring of the next year, at least 30,000 barrels of flour. And in proportion as the facilities of transporting their surplus productions to market become greater, their exports will increase. A similar estimate might be made on the amount of transportation and tolls on 50 miles of canal commencing at the Ohio river, and extending up the Scioto to the neighborhood of Chillicothe.

As the canal is extended into the interior of the state, the tolls will increase in a compound ratio on the length of line navigated. The amount of property transported on the canal will increase in proportion to the extent and productiveness of the country with which it is brought into contact, and the distance which that property will be moved on the canal, will also be greater. One cent and a half might be demanded for toll, without materially affecting the commerce of the country, whilst so great a toll should be found necessary to meet the interests of the moneys loaned for making the canal, and four cents per ton for each mile on merchandize. Assuming these as the rates of toll, if 200 miles of the canal, extending from the Lake into the centre of the state, should be completed in four years it is probable that during the fifth year the following amount of property would be transported on it, paying the amount of tolls here stated.

100 000 barrels flour on the whole length of 200 miles, being 10,000 tons	
at $1\frac{1}{2}$ cents per ton per mile, would pay in tolls,	\$30,000
20,000 bbls. pork 3,500 tons, 200 miles at $1\frac{1}{2}$ cents,	10,500
20,000 bbls. whisky, ashes and all other articles 3,000	
tons, 200 miles at $1\frac{1}{2}$ cents per ton per mile,	9,000
One half of the above amount from intermediate counties on each article transported on the canal an average of 100 miles at $1\frac{1}{2}$ cents per ton,	9,875

2,000 tons of merchandize transported on the canal from the Lake into the interior, on an average distance of 125 miles, at 4 cents per ton each mile,	10,000
15,000 bbls. salt, fish and other articles 2,800 tons, an average of 75 miles, at 1½ cents,	2,812

Making a total amount of tolls derivable from 200 miles of the canal on the Muskingum and Scioto route of, \$72,187

The commissioners entertain little doubt that the canal on this route, will pay a revenue of 4 per centum per annum on its cost, immediately after its completion, and 6 per cent. per annum within five years thereafter.

Calculating from the above data, the sums proposed to be borrowed from year to year, with the interest payable thereon, the probable amount of tolls which will be received, and the sum to be provided in addition, to pay the interest will stand as follows:

1825—Loan of \$400,000, payable 1st July.

On this a half years interest payable 1st January, \$12,000

1826—Loan of 600,000 dollars.

Interest payable this year on loan of 1825,	24,000
On loan of 1826,	36,000

\$60,000

To meet the interest due on loan in 1826, will only require a surplus revenue for that year, of \$2,000, over the balance now in the treasury.

1827—Loan \$600,000.

Interest on loan of	1825	\$24,000
on loan of	1826	36,000
on loan of	1827	36,000

Interest to be provided for, in 1827 \$96,000

1828—Loan \$600,000.

Interest on loan of	1825	\$24,000
	1826	36,000
	1827	36,000
	1828	36,000

Whole amount of interest payable this year, \$132,000

In the year 1827, the Miami canal will have been completed, and will nett in 1828, \$30 000

In the year 1827—40 miles of the Ohio canal will have been completed, and nett 6,000

36,000

Which deducted will leave to be provided for 96,000

1829—Loan 600,000.

Interest payable this year, on loan of	1825	24,000
	1826	36,000
	1827	36,000
	1828	36,000
	1829	36,000

\$169,000

This year the Miami canal will be in full operation	
and will nett	40,000
100 miles of the Ohio canal will be navigated	
and will probably nett	25,000
	<hr/>
	65,000

Which deducted will leave a balance to be provided for, of \$103,000
 1830—Loan \$600,000.

Interest payable this year on loan of 1825	24,000
1826	36,000
1827	36,000
1828	36,000
1829	36,000
1830	36,000
	<hr/>
	\$204,000

This year the toll and water rents on the Miami canal	
will probably be	42,000
175 miles of Ohio canal will be navigable and	
will yield a nett revenue of	55,000
	<hr/>
	97,000

Which deducted will leave to be provided for 107,000

1831 may require a loan of 350,000 dollars, to complete the canals, being 44,598 47 over the estimated cost of both canals, with 10 per cent. addition, to cover superintendence and contingencies on the least expensive route proposed for the Ohio canal. If either of the other routes from Coshocton to the Lake be adopted, a further sum may be necessary, unless a saving in expence, equal to the difference, can be made by a more careful location.

Interest payable this year, on loan of 1825	24,000
1826	36,000
1827	36,000
1828	36,000
1829	36,000
1830	36,000
1831	21,000
	<hr/>
	225,000

This year the revenue derived from the Miami canal	
may be estimated at	43,000
240 miles of Ohio canal will be navigated	
and will probably nett	85, 00
	<hr/>
	128,000

Which deducted will leave to be provided for 97,000

In the year 1832, both canals will have been completed and will be navigable through their whole extent; the interest to be paid will be the same as in 183 , 225,000

The revenue on the Miami canal will probably be 44,000	
And on the Ohio canal,	120,000
	<hr/>
	164,000

Leaving a balance of interest to be provided for of 61,000

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY, BY JOHN KILBOURN, AT \$3 A YEAR, IN ADVANCE.

VOL. I. COLUMBUS, OHIO, SATURDAY, AUG. 23, 1828. NO. 10.

Readers will notice that the Canal Documents are continued on the third page of every number, from the last page of the preceding number.

PROSPECTIVE VIEW.

In taking a birds-eye view of the state of Ohio, and noticing the position and direction of its principal rivers, and the canals now constructing, the following considerations occur.

We perceive, by an inspection of the Map of the state, that the Cuyahoga river, from the Portage summit, to its mouth, runs nearly a north course into Lake Erie at Cleveland.—And that the Muskingum, (or as it is here called the Tuscarawas river,) runs southwardly, from the same summit, into the Ohio river at Marietta:—thereby indicating this as a natural route for a canal to unite the waters of the Ohio river and Lake Erie.

But, it is a matter of doubt, whether a slackwater navigation for steam boats, from Marietta to Dresden, 15 miles north of Zanesville, and 90 above Marietta, might not be the preferable mode of improving this part of this line of intercommunication. Indeed, in pursuance of this plan, an act of incorporation was granted by the Ohio Legislature, last winter, for a company, to improve the Muskingum river, in this manner, up to Dresden, where it will unite with the main canal, now constructing.

Again,—in the central region of the state, the general direction of the Sandusky river, from the Sandusky plains, is to the north, and from the same plains, the Scioto river runs south, into the Ohio river at Portsmouth:—indicating a natural route of intercommunication between the Ohio river and Lake Erie:—This line is already established as a route for the main canal, from Portsmouth to Columbus, a distance of above 90 miles—then, as the canal commissioners have concluded that there is not water enough to carry a canal across the Sandusky summit, let a graded turnpike, or a rail-road be constructed from the head of this Scioto canal at Columbus to Sandusky bay of 106 miles long; we should then have a continuous line of intercommunication from the Ohio river, through the heart of the

state, to Lake Erie, at or near Sandusky bay; of less than 200 miles in extent.

Again,—by the Miami canal from the Ohio river at Cincinnati to Dayton; and from thence northwardly by the line surveyed in 1824, across Loramie's summit, thence down the Auglaize river, to the Maumee river at Fort Defiance, and thence down the Maumee to its mouth in the western extremity of Lake Erie; and we have a third or western canal, entirely across the state, uniting the Ohio river with Lake Erie.

Then by considering that portion of what is now denominated the main Ohio and Erie canal, which extends southwestwardly from Dresden, across the Licking summit into the Scioto valley, as only a cross cut, or subsidiary line, connecting the grand *eastern* and *central* avenues of internal communication, with each other, for local purposes only; and then have a similar cross canal, or rail road constructed, from Columbus to the Maumee river navigable feeder, three miles west from Springfield in Clark county, 46 miles long, uniting the *central* with the *western* canal—then, to a person taking this broad view of the improvements in Ohio, three grand avenues of intercommunication, will appear between the Ohio river and Lake Erie: namely, an *eastern*, a *central*, and a *western*; each extending entirely across the state, and all three connected together near the middle of the state, from north to south, by transverse channels, uniting them all with each other in one harmonious system: and thus bringing the facilities of canal, rail road, and steam boat conveyance, almost literally 'to every man's door.'

Extract of a letter from Mr Richard Howe, an assistant Engineer on the Ohio and Erie canal, to the editor; written from Akron, on the 7th inst.

It was yesterday that the first boat crossed the Grand Ridge between the waters of the south, and those of the north—canal boat State of Ohio fitted out yesterday for this place about eleven o'clock to cross the Grand Ridge with about sixty passengers; all pretty much from the vicinity of this place, (it was not known until the evening of the day before,) that the water was to be let in from the Tuscarawas on the south of the summit level,

therefore there was not such a concourse of people as generally collects on such occasions, however, we crossed and descended south to the mouth of Wolf creek, (about 9 miles, by the way of the canal from this place,) and then returned back to Akron about 8 or 9 o'clock in the evening. There is no obstruction to the navigation between this place, and Massillon except a few days work to be done on section eleven, (called Vanderhoop's job I am told there is now employed on this job about eighty men and probably be finished in a short time.

The canal north from Akron to Cleveland, is now in excellent order for navigation.

CHESAPEAKE AND OHIO CANAL.

Twenty miles of the canal, embracing 25 locks, and estimated at more than \$550,000, will be prepared to be put under contract by the 15th of August, eight miles and a half having been recently added, by the unremitting exertions of the Engineer, to the 11-2 miles first proposed to be let at that period.—Contractors, from every part of the Union, are already repairing to the line of the canal; and, when commenced, the work may be expected to be prosecuted with great animation. The Charter of the Company expressly provides that no legal controversy shall arrest, or even retard its progress. It is confidently believed, that the first sixty miles, extending as far up the river as Harper's Ferry, will be completed by the expiration of the ensuing year; and that the entire Eastern section will be placed under contract within the same period, so as to lay the foundation of its completion to the coal banks in three years from its commencement, which we date from the 4th July, just past.—*Nat. Int.*

IMPROVEMENTS IN CANADA.—We learn from the Montreal Gazette, that since the visit of the Commissioners to the Rideau Canal, the works which had been suspended are resumed, and that the expenditure on the works this season will be greater than in the last. The locks at Bytown are to be laid 134 feet in length, and 33 feet in breadth, so as to admit the passage of steam boats of considerable tonnage. Other locks are to be constructed of the same dimensions along the Grenville Canal, and when the line is completed, the small locks already erected are to be taken down, and enlarged. The paper adds,

Thus when the Welland Canal is completed, large vessels and steam boats will be enabled to sail without interruption from the heads of the Upper Lakes to the upper end of the Lachine Canal, which at present admits Durham boats of the largest class through. The locks on the latter canal could be easily enlarged, and at no very distant period vessels from the ocean may yet carry the peaceful commerce and display the meteor flag of Great Britain, on the waves and shores of the Erie, the Huron, and the Michigan.—*Boston Weekly Messenger.*

"It is therefore time to look about and see what is next to be done to preserve our present proud ascendancy. This is no difficult matter: and if we were worth as much money as John Jacob Astor, we know how we would

not only double our own capital, but at once put the city and state of New York beyond the power of rivals, and the reach of competition. Let the capitalists of New York look at the map for a few minutes. Commencing at Dobb's Ferry, let them glance along a line drawn through the counties of Rockland, Orange, Sullivan, Delaware, Broome, Tioga, Steuben, Allegany, Cattaraugus and Chautauque, to Portland upon Lake Erie. What a promising route for a rail-way! It would strike the rail-road soon to be made from Ithaca to Owego, and intercept the produce of all the rich valleys of all the streams which flow from our state into Pennsylvania. And it might be continued west to any extent. From Portland the road might be continued through the north-western corner of Pennsylvania, and Ohio, to Michigan; thence along the southern part of Michigan, thus cutting off the long circuitous and tedious navigation up the Straights and through Lake Huron, thence past Green Bay up to the head of Lake Michigan. And beyond this point, it might be continued from time to time as the country should become settled, crossing the Upper Mississippi to the Missouri and the Rocky Mountains. The project is one of vast importance and magnitude. If the scheme should be considered visionary, so was the Erie Canal twelve years ago. But from the Hudson River to Lake Erie, there is nothing visionary about it."

N. Y. Com. Advertiser.

MORRIS CANAL.

Inclined Plane at Boonton Falls.—The great experiment to test the value of inclined planes, as substitutes for locks in cases, where high elevations are to be surmounted by canals, has been at length tested upon the Morris Canal, with all the success that could be desired. On Friday last, a party of gentlemen from this city, accompanied the President and Directors of the Morris Canal, to visit the inclined plane at Boonton Falls, and on Saturday the works were put in operation to the satisfaction, according to the Newark Sentinel, of all present. The machinery for the passage of boats from one level to another, has been improved and simplified from that used at Rockaway.—The Boonton plane is nearly 1000 feet in length—overcomes an elevation of 80 feet—and can be passed in 20 minutes; whereas to overcome the same elevation by common lockage, would require 80 minutes. It is evident, therefore, that, by this invention, not only a much greater facility is afforded to the passage of boats, but greater economy in their construction, when compared with the expenses of ordinary lockage.—*ib.*

From the Western Courier.

The water from the Tuscarawas river was let into the canal at the Portage summit, on the first inst.—On the 6th the Ohio (Canal boat) passed from Akron, to the Tuscarawas Portage, and returned the same day crowded with citizens' who collected from various quarters to witness this interesting event.

The Canal is now navigable from Cleveland to Massillon a distance of 64 miles.

The business will gradually increase on the canals as the lines of commercial intercourse become known and established, and as the surplus productions of the soil are augmented by the stimulus produced by an easy access to a safe and certain market; so that in the year 1837 the nett income of the canals will pay the interest on all sums borrowed for their construction. After which time the increase of business and revenue on the canals, will yield a surplus fund for the redemption of the loans.

Should the General Assembly make the proper provisions for constructing the proposed canals it is probable that the necessary loan can be negotiated, and the necessary surveys and examinations completed, so that the work may be commenced as early as the first of July. And from the above calculations it will be seen that it is proposed to complete the work in the year 1831.

It will be seen, that the foregoing estimates in relation to the proceeds of the canal, while in a state of progression, are founded mostly on conjecture, and may or may not be fully realized. This is not the case in relation to the sums of money to be borrowed, and the amount of revenue necessary to meet the interest on loans. These estimates, allowing the rate of interest to remain at six percent. are certain. In order to give entire confidence in the faith of the state, the board respectfully suggests the policy of enacting by a law of the present session, the imposing of a tax on land for the year 1825 that shall bring into the treasury the sum of twenty-four thousand dollars; and for the year 1826 such tax, or such a per centum on the valuation of lands subject to taxation, as will bring into the treasury the sum of fifty thousand dollars; for the year 1827 the sum of ninety-six thousand dollars; for the year 1828 the sum of one hundred thirty thousand dollars; for the year 1829 the sum of one hundred sixty-eight thousand dollars; for the year 1830 the sum of two hundred and four thousand dollars; for the year 1831 the sum of two hundred and twenty-five thousand dollars; which taxes so laid and assessed for the several years above named shall be specifically appropriated to the canal fund, for the payment of the interest which may fall due in each of those years on the loans which may be authorized; and that in no case shall the taxes so laid be applied to any other purpose, nor reduced by the act of any future Legislature so as not to produce from the tax so levied for any particular year, together with the amount of the nett income of the canals actually paid into the treasury for such year, a sum sufficient to meet the amount of interest which may be payable for that year on all loans; and also such additional sum as the General Assembly may think proper, for the gradual creation of a fund for the redemption of the principal sums so borrowed:— And further that the nett income of the canals and the privileges connected therewith, together with so much of the land tax as may be found necessary therefor, be appropriated and pledged for the regular payment of the interest on all loans obtained under the provisions of such act and for the gradual and regular creation of a fund sufficient for the redemption of the principal when the same shall be, by the terms of the loans, redeemable.

The above calculations are all predicated on the supposition of obtaining loans at an interest of six per cent. It is, however, believed that loans may be obtained at a lower rate of interest, especially after the first, if strict punctuality be observed in the payment of the interest.

All which is respectfully submitted,

BENJ. TAPPAN,
T. WORTHINGTON,
E. BUCKINGHAM, Junr
ISAAC MINOR,
N. BEASLEY,
ALFRED KELLEY,
M. T. WILLIAMS.

Columbus, January 8, 1825.

APPENDIX.

REPORT OF DAVID S. BATES, ESQ. PRINCIPAL ENGINEER.

To the Board of Canal Commissioners of Ohio,

GENTLEMEN:—Agreeably to your request, and arrangements, on my arrival in Ohio, I proceeded to examine such streams of water, as could be used for the purposes of canals, on any or all of the different routes which have been surveyed.

This examination resulted as follows:

Cuyahoga at Stow,	5,564 cubic feet per minute
Little do. at Tallmadge.	1,344

These streams, I am informed, were formerly lower, and had been gauged at 4,000 and 800 feet, what they have been reduced to, they may be again, I therefore estimate them

	<i>cubic feet per min.</i>
At,	4,000
And,	800
Tuscarawas, at Old Portage bridge,	2,500
Chippeway, at Hosmers,	60
Killbuck, and Little Killbuck,	80
East branch of Black river,	2. 73
West or Main do.	20
Owl creek, a short distance above Douglass's mills,	1900
East branch of Whetstone,	94
West do. do.	77. 66
Sandusky river, south at bend, where it can be taken out and led by a feeder 10 miles long, to Tymochtee,	59. 48
Broken Sword, (too low to be brought to the Tymochtee Summit,)	47
Sandusky below the mouth of Broken Sword,	112. 50
Little Scioto, (too low for the Tymochtee level,)	36. 72
Scioto river, above the mouth of Rush creek,	30
Do. a few miles below Rush creek, the next day after severe rain,	128. 86
Whetstone, both branches combined, at Delaware,	314. 33
Rush creek Lake out-let, (less than one foot,)	1
Buckingelas creek (can be carried to Tymochtee by a feeder 22 miles long,)	239. 98
Cherokeemans run (can be introduced by the above feeder)	138. 86
Great Miami at Solomons town, (dry by information three weeks prior to gauging,)	41. 92
Scioto at Roundheads town,	40
M'Key fork of Stony creek, (supposed to be too low,)	330
Great Miami six miles north of Sidney,	1739
Raccoon fork of Licking, at Newark 1125, but at the junction of North fork feeder including Ramp creek, estimated at	1050
North fork of Licking,	850
South fork do.	269
Walnut creek,	472
Big Belly,	2,000
Scioto at Columbus,	1,500
Scioto and its tributaries, at the mouth of Deer creek, (not gauged but estimated,)	4,000
Mad river, near north line of Clark county,	10,000
Honey, Lost, Millers and Caldwells creeks,	500
Mosquito,	500

Route from Cincinnati, by the Miami and Maumee Rivers.

From Cincinnati, the southern extremity of this route, two lines are run, both of which are practicable.

The western of these, follows the valley, after having taken its departure from the lower part of the city, to a point near to White's mill, about nine miles from Cincinnati. The other or eastern line, separates from the Ohio at the mouth of Deer creek, and crosses the upper plain of the city a little north of the court house—thence near the road, and at no great distance from the first line, to the point, at White's mill above mentioned.

Generally, through the whole extent of these lines, some difficulties occur, such as abrupt undulations, sidelying ground, and ravines of considerable depth. But the expense of constructing a canal on them, is not alarmingly great, and the tact and science of the engineer will make, over them, a secure canal. The worst feature is a bank with which the lines come in contact, near Irwin's mill, which shows symptoms of slipping and must be met with much caution.

From the junction of these lines, the canal is carried northward, through the valley of Mill creek, in an easy pleasant soil, without much obstruction, to the Miami near Hamilton. It then takes its course through the immediate valley of that river, to Dayton. In its progress, it receives the Miami river as a feeder, at or near Middletown. There are a few difficulties on this line which will be encountered, consisting of three or four bluff and river-washed-banks. They present but little other items of expense, than that which will arise, from shielding their outward and exposed sides with stone, placed either loosely against them, or paved or flagged. One of them is near Dayton; one, two miles below Franklin, and one or two between Dicks creek and Hamilton, they are all of them short. At Dayton the Mad river will be crossed by a dam. This being crossed, the line ascends the valley of Mad river about 18 miles to the summit, which will be ascended, by 81 feet of lockage, which together with 430. 40 feet of lockage, which is placed in its appropriate situation on the line, is 511. 40 feet.

From this point, which we may call the south end of the Loramies summit, the difficulties, which heretofore have been slight, begin to increase. The line from here to the Miami river, is not however, uncommonly bad. As the water to supply this summit, and many miles more to the north of it, must be introduced generally from the Mad river, it may be proper here to state all that can be depended on for this purpose, viz:

Mad river,	10,000 cubic feet per minute
Honey, Lost and other creeks,	500
Miami river,	1,739
Mosquito creek,	500
	<hr/>
	12,739

The whole distance necessary to be fed with this supply, is 135 miles of main canal, to which add Mad river feeder, 15 miles, and Miami feeder 10 miles—in all 160 miles.

The capacity of a canal of the common size, not being great enough to carry forward the quantity of water necessary to feed this line, or even to convey that part of the feed which is derived from Mad river, I have advised that the canal be sunk one foot deeper and with different bottom width, preserving nearly the same top-water line; by this means the quantity received can be sent forward without exposing an unnecessary surface to the power of evaporation. In ordinary canal, one hundred cubic feet of water per minute per mile, is necessary for its supply.

The above amount of 12,739 feet is all we can get, and this, unfortunately, is principally derived from a fountain at one end. This amount will give about 80 cubic feet per mile per minute, and when the water wasted by locking down from the summit is taken into the account, it will probably reduce the supply to about 70. For a canal made with common caution, on the line from Mad river to Cynthian, this would stand but a feeble chance of rendering a supply—its embankments, aqueducts and sidelaying positions, would speedily swallow up all this water, and destroy the navigation. To remedy this evil, as far as it can be remedied, and to make the most of the means placed in our power, I have advised and calculated a declivity in the line sufficient to force the water forward at the rate of $\frac{3}{4}$ of a mile per hour. In addition to this, it will be necessary to line and puddle all such parts as are sidelaying, porous, or in any other way, have a tendency to expend water. This expense is not calculated in the estimates herewith presented; but should the plan be carried into effect, it must be, and will probably amount to more than two hundred thousand dollars. It is necessary to render this part of the line as impervious as earth can be rendered. On the success of this process depends the probability of retaining a sufficiency of the supply for the purpose of continued navigation; yet could a situation be found near the line, or any where in its vicinity to which the line might be directed, on which a reservoir of a few hundred acres could be constructed, the fears which are entertained, of a deficiency of water on this line would be greatly lessened. From information received from a source entitled to high credit, I am led to believe the object worth seeking for. A position in or near the valley of the Little Auglaize, has been mentioned; but nothing can at present be definitely calculated on.

The feeder from Mad river, in all its length, except about two miles, presents difficulties of a very formidable nature. From the necessity of attaining the summit, the line is kept up as the valley descends, and consequently, is often hung along on the steep declivities, which bound the river bottoms, and in one place, for nearly one and a half miles, is stationed on the side of a ledge of rocks which rises perpendicularly 13 or 20 feet above it, while the base is more than thirty feet below. At this place we are under the necessity of embanking on the base below the line, or cutting down a bench sufficiently wide to construct the canal on the brow. The former has been adopted, under an impression that it is more safe and less expensive. There are several very extensive embankments on this line, several points of deep cutting, and places where the excavation will be in rock, and almost all of it on steep sidelaying ground.

The feeder from the Miami is also formidable, but by no means so much so, as the other. A very considerable part of the line, from a point about three miles south of the high rocks, to Cynthian, on the Loramies creek, will also require great care, and some increase of expense. From Cynthian northward, all uncommon hardships have ceased, except some deep cutting, near Fort Loramies, and an embankment, and washed-bank near St. Mary's.

The line from the latter place to Auglaize is very fine, the soil close and retentive, and almost impervious. The face of the country even, and its northern declivity gentle and regular. Having arrived at the Auglaize, it is thought proper to cross that river by means of an aqueduct. Much hope was entertained that the waters of Auglaize would be useful auxiliaries on this line; but this does not appear to be the case. The Auglaize, Hog river and Blanchard's fork, decrease during the dry summer months, to very diminutive sizes; and it is believed that their united strength, will not, during this depression fill a dam of six feet high, consequently, a loss of water would ensue. A further object is attained by this measure, the line can be thrown back from the river, in its course to Defiance, and will be constructed cheaper than on the immediate bank, and better retain its water.

From Defiance to the head of Maumee rapids, it is proposed to dam and lock the river, using it as a canal by making a double towing path. The same method offers down the rapids, but a canal is estimated on both these divisions, and on the latter is quite feasible. As both these modes present themselves, the method of construction can, and will be more intelligently settled by the commissioners and constructing engineer, who will be enabled to make judicious calculations from a more intimate knowledge of facts, than could hitherto be obtained. A little below the mouth of Auglaize it is necessary to drop into the river, to obtain a supply of water, no eligible chancee having before presented, and when its level is attained, either course can be pursued.

Having descended to the foot of the rapids the question remains, how shall the improvement terminate? From soundings taken, it appears, that there is not depth of water sufficient at that point to float large vessels.

The plan which seems to me most feasible, is to pass down the stream about three miles or nearly so, to a narrow pass which presents itself in the river, across which is a reef of rocks, which renders the water about 6 feet deep. At this point throw a firm durable dam across, which shall raise the water on the inside four, or as many feet as are necessary; in some part of this dam, construct a lock, (first reducing the lower part of the reef for a channel,) of sufficient magnitude to admit all such vessels as generally navigate the Lake, or such as can pass into the Bay.

To this point, or as near it as is necessary, a towing path can be easily and cheaply made.

The expense of this dam, which will be 891 feet long, will be about \$3,200; of the lock about \$6,000; of deepening the channel, below the lock, perhaps \$1,000, in all \$10,200.

Permit me to add, that in the calculation of this line, I have thought proper to add to the estimates $12\frac{1}{2}$ per cent. on all that part which lies north and west of the high rocks on the Miami. This is done to balance the expense which will attach to all contracts, which must be performed in a district of country, so thinly populated as this is.

The whole amount of lockage from the summit to the foot of the rapids is 371 feet nearly—to which add the lock described, on the reef five feet fall and the total sum is 376 feet.

Add also the amount from the summit south, the amount will be 887. 4 feet of lockage on this line.

Line of canal from Portsmouth, at the mouth of Scioto to Lake Erie; by way of the Licking summit.

The south end of the Scioto valley presents a difficult line; but still the engineers have been able to make a tolerable good location, and let me add, a much better one than could have been expected from a cursory inspection of the valley. Many rough positions which seemed appalling are passed without incurring enormous expense or very great danger.

The line for this canal, has been run through all its distance, on the eastern side of the Scioto. From Piketon to Circleville, a choice of sides may be had. Either side is practicable; but a few days inspection are necessary to determine which of the two is cheapest, and will be most conducive to the public interest. A dam or dams will be necessary on the Scioto for the purpose of procuring supplies of water, and of recovering to the use of the canal what it shall have lost by filtration in its course from the upper country; and when these dams are made, it will be easy to select such side of the river from them as the interests of the state and the canal may require.

In the progress of the line north, it receives the waters of the Scioto, from Columbus, by a navigable cut of $10\frac{1}{2}$ miles long, which forms a junction with

the main line about 3 miles eastwardly from the mouth of Big Belly, which latter stream is also connected with the main line at the same place.

I have valued the Scioto at 1500 cubic feet per minute, and the Big Belly at 2,000. A few miles further east the Walnut creek is acquired, which is estimated at 472 cubic feet. After receiving the latter, several streams of minor importance are introduced, and should it be necessary, the Big Belly and Black Lick can be united with the main line, by a feeder of moderate length, east of the junction of the Walnut.

From the entrance of the canal line into the vallies of the Big Belly and Walnut creeks, nothing occurs to disturb the construction of the canal, till the line arrives at the Licking and Walnut summit, or more properly the dividing ridge between the waters of the Scioto and Muskingum. This ridge presents a cut, which in its deepest part is 32 feet, and at its ends 11 and 12 feet, its length is 152 chains, or a little more than one mile and seven eighths. So near as can at present be ascertained, there is nothing in this ridge to be encountered, that can create any difficulty but its depth. No indications of either rock or quicksand are apparent. This being the case, this summit is divested of much of its terror, and can, for no inordinate sum, be reduced.

At a distance of about three miles eastwardly from this ridge, the south branch of Licking presents itself. Near the south bank of this stream, there is a succession of small lakes, situated in a flat about eight miles long, which connects itself with the south branch of Licking.

These lakes, supplied from the adjacent country by several durable streams, at all times discharge, into the south branch a considerable quantity of water. The shores of this flat or prairie, are bold and well defined except on the northwest side which has less acclivity for about a mile. By throwing an embankment across the out-let of the lakes and another along its northern side, above alluded to, a reservoir may be formed which will contain a superficies of 111,513.600 square feet. The depth of the reservoir so constructed may be 6, 7 or 8 feet—6 feet is proposed though more may readily be obtained.

It may be proper here, to state the quantity of water, on which reliance is placed, for the supply of this summit. The whole length of line to be supplied is, about 41 miles; from this should be deducted that part of the line, which embraces the deep cut on the ridge and such other part as lies contiguous to, and connected with the reservoir, in all about eight miles, which will inevitably feed itself, and the remaining line requiring adventitious supply will be 34 miles, lying between the Walnut creek feeder and the first lock east of the summit ridge, near Newark. To supply this line the following waters can be commanded:

Owl creek, which guages	1900 c. ft.
From which deduct, loss by 9 miles of feeder to carry into the North fork of Licking at 50 feet per mile	450
	<hr/> 1450
North fork of Licking	860
Raccoon fork of Licking and tributaries	1050
South fork,	269
To be received from the reservoir	2000
	<hr/> 5619
Length of line 34 miles, as per calculation above, including feeders, all of which by computation, will expend 100 cubic feet per minute on each mile	3400
	<hr/> 2219 c. ft.

The above balance, will, we feel well assured, enable us to feed this summit without a recurrence to Owl creek, which being very important in its neighborhood, it is very desirable to leave untouched. After deducting the amount derived from that source, the balance still on hand, will amount nearly to the quantity received from the North fork of Licking. But this does not show the whole amount of strength, on which reliance can be placed. The quantity of water, proposed to be laid up in the reservoir (6 feet) will in 120 days, be drawn down only 2.59 feet. As evaporation will have its effect on this reservoir, we will suppose its process will overpower the receipts into it, and that it will reduce two feet in addition to what has been drawn for use; then the whole amount gone will be 4.59 feet, leaving still in store 1.41 feet of depth. This depth gives 157,235,176 cubic feet of water, which is equal to 90 cubic feet per minute, for 120 days, a quantity which will do away the necessity of applying to the North fork altogether, and be equal to the supply of very great contingent demands besides. This reservoir will fill by the floods from the surrounding country, and if necessary the South fork of Licking can be led into it as an auxiliary, either by passing it through or under the canal.

This part of the country seems as if it was calculated by nature for our use in the prosecution of the project. About two miles westerly from this is the Bloody run swamp, which can be constructed into a reservoir, in which may be deposited 400 millions of cubic feet of water should it be necessary.

From this point to the narrows on Licking, all is easy—and these also will be easily and cheaply improved, by using the creek, which will be held up to the necessary level by a dam, and constructing a tow path on its northern bank. A double purpose is subserved by this measure, much of the current expense is saved per mile, during our continuance in the creek, and the creek itself restrained for the purpose of feeding the canal in its progress eastward.

After passing this part of the line, the canal is from necessity held up on a sidelying bank, and its course circuitous, till it arrives at the point, where it can pass over into the valley of Tomaka, a short distance west of the village of Irville.

In its passage over some cutting of about 12 feet deep for a short distance is encountered. The valley of Tomaka is with little exception favorable for canalling, and the supply of water to the Muskingum, abundant.

The distance from the narrows to the ridge or crossing place from the Licking to the Tomaka valley, is about four miles. About midway a chance presented of passing over into the valley of Tomaka by a short route, and one that would avoid a large single embankment, which offers itself on the line as now surveyed. It would also shorten the whole distance about two miles. To embrace this chance it is necessary to ascend a small creek, which runs into the plane through a farm on which Mr Solomon Wood resides. By ascending this, the ridge is met where it is narrow, but rises 70 feet above the level of the canal. This ridge could be perforated, and a tunnel put in which would be 20 chains long, and would have at either end some deep cutting, extending in all, about 20 chains more.

CALCULATION.

Tunnel arch, 21 feet clear width, walls	}	11,719.20 per a \$5,	\$58,596 00
2½ feet thick, including buttresses,			
Excavation, average 38 by 39,		55,726 yds. at 40	23,090 40
Timber for foundations,		72,600 ft. " 2½	1,815 00
Centers,	\$650 for	66 ft.	12,000 00
Towing path bridge, 1320 ft. at \$1 per foot,			1,320 00
Excavation at ends, 36,650 yds. at 18 cents,			6,400 60

The two heaviest miles, on the calculated line at this place, are computed to cost,

\$103,222 00

26,533 00

\$76,699 00

The accounts of Tunnelling in England, place their cost at about five dollars per inch, run. The tunnels there, are said to be made of brick. Could bricks be relied on here, the cost of tunnelling would probably be much less than the above calculation.

At the junction of the Licking and Muskingum line, the meeting of the supplies of water, which have been received into the canal, will probably make very important hydraulic situations. At this point the surplus must be discharged, and its uses may do much towards compensating for the increase of lockage occasioned by two summits.

The route up the Muskingum from the mouth of Tomaka, is in general pretty good. A single bluff, however, intervenes, which like all others of the kind, will increase the expense, but is not very difficult.

From a point near Coshocton, two lines have been run to the Portage summit; one passing up the Whitewoman and Killbuck vallies to Harrisville, thence to the Old Portage bridge across the Tuscarawas.

This line will depend for its supply on the following waters, viz:

Chippeway,	60 ft. per minute
Killbuck,	80
Tuscarawas,	2500
Cuyahoga,	4000
Out-let of Portage Lake,	100
Wolf creek,	100
	<hr/>
	6,840

The length of line to be fed by these waters is, from a point a few miles above Wooster to Portage, forty-three miles, and the Portage summit northward, four and a half miles, in all forty-seven and a half miles of canal. To this must be added fifteen miles of feeder, which it will be necessary to cut and improve from Cuyahoga river in Stow, to the Portage summit, in all 62 miles.

The valley of Killbuck gives us, generally a good line, and the water which can be brought to bear on it, is sufficient for the purposes of a canal through it.

The other line was run through the Tuscarawas valley, and arrives at the same point on the Portage summit, as does the first described. This line will depend for its supply of water upon the following, viz:

Tuscarawas,	2,500
Out-let of Portage Lake,	100
	<hr/>
	2,600

The length of this summit is about nine miles, and will receive the water above stated, without any cost to introduce it. The position of this line embraces the Tuscarawas, by a dam of small dimensions and in its course northward, comes in contact with the Portage Lake, which may be led into it by simply passing the water through a flume.

The quantity of water expended on the New York canals, has been found to be 100 cubic feet per minute per mile, in ordinary cases. This amount is the datum on which I have founded all my calculations on this subject.—Hence it would appear that this summit, and the first line are fully accom-

modated with water. The process of feeding the line down the Tuscarawas and also down the Cuyahoga is cheap and easy. In addition to the several important streams in both, which will be brought in by crossing them; we can at any time when the necessities of the canal require it, drop down and take in the main streams.

Several washed and bold banks meet our passage down all these vallies; but none of them present serious difficulty. The romantic point on the Cuyahoga, called the peninsula, at which the line crosses the river from the west to the east side, will require a lock and aqueduct combined. All the materials, whether this aqueduct shall be made of stone or wood, are in the immediate vicinity of the point where it must be erected.

A continuation of the line through the Killbuck valley was also run from the Harrisville summit, down the valley of the Black river, and terminating at the mouth of French creek, to be continued by a towing path on the bank of the river to its mouth.

This line and termination will depend for its supply, on the following streams, viz:

Chippeway, which in its natural state yields 60 feet of water, but by cutting down the out-let of Chippeway Lake and sustaining its level by a dam, may be made to yield during the dry season,

	387
Killbuck,	80
Tuscarawas, (at the Old Portage bridge,)	2,500
Cuyahoga, (town of Stow,)	4,000
Out-let of Portage Lake,	100
Wolf creek,	100
	<hr/>
	7,167

The length of line to be fed by these supplies, is from a few miles above Wooster to French creek, forty-five miles; to which must be added forty-nine and a half miles of feeder, in all ninety-four and a half miles. To aid the above feeder it is possible by very deep cutting, through several miles to introduce the Little Cuyahoga. The expense, however, would add very greatly to the present calculation.

The termination of any line which will meet Lake Erie, through the valley of the Cuyahoga, must be in a harbor at the mouth of that river. This presents one of a safe and convenient kind, with an exception which applies to all the harbors, on the south side of the Lake, viz: A bar of sand partially choking up the channel, at the immediate place of meeting of the Lake and river waters. This bar in September last presented seven feet of water, but I am informed that it is sometimes so much increased as to present a less depth of channel.

To remedy this defect a mole is proposed to be commenced, at the shore on the east side of the river, and to extend outward nearly at a right angle with the shore, until it shall arrive at water of sufficient depth to float such vessels, as are in the constant practice of navigating the Lake.

A cheap, simple and durable method of doing this, has been thought of, a plan of which is herewith presented.

The situation and natural formation of the harbor at the mouth of Black river, is in many respects similar to that at the mouth of Cuyahoga. The necessary extent and strength of the mole exactly the same and the method of improving in all respects similar. This being so it is unnecessary to give a detailed statement of it.

Tymochtee.

About the middle of September, I made an examination of the streams relied on for the supply of this summit.

I shall mention them in the following order, viz:

- 1st. Those which naturly belong to the Sandusky plain.
- 2d. Such as can most readily be brought to a canal, should one be constructed on that plain.
- 3d. Such as might by mere possibility be brought to it.

Class 1st.

Scioto, guaged below the mouth of Rush creek, feeder 6 miles,	<i>feet per minute</i> 128. 86
Sandusky, guaged at the south bend, where by a dam 10 feet high, the water can be conducted towards the Tymochtee summit line, by a feeder 10 miles long,	59. 43
	<hr/> 188. 29

Class 2d.

East branch of Whetstone,	94.
West do. do.	77. 12
These will be added more economically by taking the main Whetstone into the line about 11 miles south of Delaware,	
Whetstone after the junction of its two branches, guaged about 1½ miles above Delaware, (feeder to introduce it 11 miles,)	314. 33
	<hr/> 502. 62
Buckingelas, a branch of Great Miami by an artificial feeder 22 miles, and natural, in the bed of Scioto, about 40 miles,	289. 98
Cherokeemans run by the same feeder,	138. 86
Great Miami near Solomon's town,	41. 92
	<hr/> 973. 38

Line to be Supplied (canal)	*57 miles
Buckingelas (artificial feeder)	22
(natural do.)	40
Scioto and Sandusky,	16
	<hr/> 135

I have introduced into the Erie canal, in New York, during the fore part of 1824 from the Genesee river 7770 cubic feet of water, and from several other sources, 230 feet more—with this water I have supplied that canal from Rochester on the Genesee river eastward, 57 miles; and from the same place westward to Brockport, 20 miles, and 2 miles of feeder—in all, 79 miles.

* This is stated at 57 miles, as the distance between the mouth of Tymochtee, where the canal must drop into the Sandusky river, and the point at which the supply from Whetstone can be received. Should this arrangement be carried into effect, it will be necessary to extend the summit, and the line to be fed by its waters about 13 miles further, as no accession of feed can be obtained till the line approaches Columbus.

That part of the canal line from the Genesee river westward to Brockport, was completed and filled in October, 1823, and was used till its use was prevented by frost in December. It was then emptied, and continued empty till April 1824, when it was again filled, and has been kept in use till the present winter. Since April, it has received its supply from the Genesee river.

This supply has all been passed through the aqueduct at Rochester. On this part of the line were two waste-weirs, which were suffered to expend water so long as the land drains yielded their tribute. These failed and the water showed evident signs of diminution towards the latter part of July. On the first day of August I caused the waste-weirs to be closely shut, so that they could expend no water. Between that time and the 20th of August, I, several times gauged the quantity of water which passed through the aqueduct to the west, and the results of three different gauges taken with great care, was nearly 2100 cubic feet of water per minute, passing on to feed 20 miles of canal which has no lock, nor at that time had any perceptible outlet. The remainder of the supply, 5900 feet, was passed eastward to furnish the first mentioned 57 miles. From these data and others to me equally conclusive, I have based my calculations, on the necessity of procuring at least 100 cubic feet of water per minute per mile, for the purpose of locking and navigating an ordinary canal. It will be seen by this that the water belonging to the first and second classes is utterly and entirely inadequate.

Class 3d.

Sandusky and Scioto,	188. 29
Whetstone,	314. 33
Mad river, Miami and several creeks,	12,739. 00
	<hr/>
	13,241. 62 ft.
Length of main canal to be supplied, viz:	
Tymochtee summit,	57 miles
Sandusky and Scioto feeders,	16
Whetstone, from Delaware do.	11
do. Mad river to Loramies,	76 miles
From Loramies to Scioto feeder	115
	<hr/>
	191
	<hr/>
	275 miles

In addition to the above I have thought proper to give the probable expense of a canal on this plan.

From Portsmouth to Big Belly, }	97 miles	\$308,053 47
Big Belly to Columbus, }		50,191 71
Columbus to Lower Sandusky—113 miles		982,715 80
Scioto, Whetstone and Sandusky feeders—27 miles		234,808 20
Mad river to Loramies—76 miles		1,072,929 62
From Loramies to Scioto feeder—115		1,000,109 00
		<hr/>
		4,148,807 80
Add two locks on the line from Loramies		13,882 00
		<hr/>
		4,162,690 80
Deduct for difference of lockage		234,053 00
		<hr/>
		3,928,637 80
Add for contingencies 10 per cent.		392,863 00
		<hr/>
		\$4,321,500 80

In making the above estimates, I have taken such parts of the line actually located as would connect themselves with this plan, at the estimates as they are presented in their proper lines.

To make the residue I have taken an average of the least expensive line estimated.

From the above calculation of water applied to distance it will appear, that all the feed which can be obtained from these sources is inadequate to the requirement, by more than half. I know of no method by which a line of canal over this summit can be satisfactorily supplied with water. A reservoir has been proposed; cutting and draining marshes, and damming low grounds, also. The route is with some a favorite one, and every expedient and device, has been offered, to feed it, that ingenuity could suggest. The merits of all have been examined, and that examination, has resulted in a firm conviction on my part, that it would be imprudent to attempt to make an artificial navigation on this line. I have estimated the cost of a reservoir at \$446,405. The particulars of which estimate will be attached to the general estimates.

Other routes have water in abundance, have favorable vallies in which to construct such improvements, internal and external resources and relations, which will be highly interesting and beneficial to the state, and on these should your Legislature bestow its regard, I feel confident that it cannot be disappointed.

In making the estimates which are herewith presented—I have taken into consideration the nature of the soil to be acted on, the value of labor and provisions in the state of Ohio, and have compared them with the circumstances which made the canal in New York expensive, or otherwise, and I feel a confidence that under the exististing order of things, the estimates presented are liberal.

I have seen the New York canals from their commencement to the past season, and know the state of society and its interests, both before their commencement and during their progress, and will freely hazard the expression, that deprive that state of its canals, and she is robbed of half her worth. I beg leave to tender my thanks to the engineers, regularly employed on your lines, for the assiduous attention, and intelligent zeal, with which they have made their surveys, and rendered to me their assistance in these computations.

DAVID S. BATES, *Engineer.*

January 8, 1825.

AN ACT

To provide for the internal improvement of the state of Ohio, by navigable Canals.

Sec. 1. *Be it enacted by the General Assembly of the state of Ohio, That the board of canal commissioners, created by an act, entitled "An act, authorizing an examination into the practicability of connecting Lake Erie with the Ohio river by a canal," and the several acts supplementary and in addition thereto, shall hereafter consist of seven members, to be appointed by joint resolution of the Senate and House of Representatives, and shall hold their respective offices during the pleasure of the General Assembly, subject to be removed by a joint resolution of the two houses, and any vacancy in said board shall be filled by like joint resolution. and the said commissioners shall choose one of their number to be President of said board, and may ap-*

point a fit person for their Secretary, who shall be allowed and paid such compensation for his services, as said commissioners shall deem proper and reasonable, and said commissioners shall select from their board any number, not exceeding three, to be denominated the acting canal commissioners, and shall allow them such compensation, as may be deemed just and reasonable, not exceeding three dollars per day each, and the President of said board or any other member thereof, duly authorized by the board, shall have power to call a meeting of the same, when in his opinion the public interest requires it, and a majority of said board shall form a quorum for the transaction of business, each of whom shall take an oath, or affirmation, well and faithfully to execute the duties of his appointment, and said board may adjourn from time to time, to meet at any time and place they may think proper, and further the said commissioners shall have power to employ such and so many agents, engineers, assistants, surveyors, draftsmen and other persons, as in their opinion may be necessary to enable them to fulfil and discharge the duties imposed upon them by this act, and allow and pay said agents, engineers, assistants, surveyors, draftsmen and other persons for their respective services, such sum or sums as may be adequate thereto.

Sec. 2. That the said canal commissioners are hereby authorized and empowered in behalf of this state, and on the credit of the fund hereby pledged, to commence and prosecute the making of a navigable canal on the Muskingum and Scioto route so called, from the Ohio river, at or near the mouth of the Scioto river by the way of the Licking summit and the Muskingum river, to Lake Erie, commencing at the most eligible point on the Licking summit, and such intermediate point or points, between said summit and Lake Erie, and said summit and the Scioto river, as in the opinion of said commissioners, will best promote the interest of the state: And likewise a navigable canal on so much of the Maumee and Miami line, as lies between Cincinnati and Mad river, at or near Dayton.

Sec. 3. That for the purpose of carrying into effect the object hereby contemplated, there shall be constituted a fund, to be denominated the "*Canal Fund*," which shall consist of all such appropriations, grants and donations, as may be made for that purpose by the Legislature of this state, and by any individuals; and also all moneys which may be raised by the sale of stocks as hereinafter provided, and the taxes by this act specifically pledged for the payment of the interests upon such stocks.

Sec. 4. That there shall be a board of commissioners to be denominated the commissioners of the canal fund, which board shall consist of three members, each of whom shall take an oath or affirmation, well and faithfully to execute the duties required of him by law, who shall continue in their appointment six years and until their successors are appointed and qualified, which board shall continue until the stock which shall be created, as hereinafter provided, shall be wholly paid and redeemed, and that the terms of service of the three persons first appointed, shall be so arranged that one of their terms shall expire at the end of two years, one at the end of four years, and one at the end of six years, to be decided by lot, so that one of said commissioners shall be appointed every two years, and should a vacancy happen in said board by death, resignation or otherwise, during the recess of the Legislature, the Governor for the time being shall appoint a person or persons to fill such vacancy until the Legislature shall act in the premises: *Provided*, That any of said commissioners may be removed by joint resolution of both branches of the Legislature, and that the following persons and their successors shall constitute said board, to wit: Ethan A. Brown, Ebenezer Buckingham and Allen Trimble: That a majority of said commissioners shall be a quorum for the transaction of business, they shall superintend and manage the canal fund, and shall receive, arrange and manage to the best advantage

all things belonging thereto; they shall borrow from time to time, moneys on the credit of the state, at a rate of interest not exceeding six per centum per annum, and not exceeding in the year eighteen hundred and twenty-five, the sum of four hundred thousand dollars, and in any succeeding year, during the progress of the work hereby contemplated, a sum which shall not exceed six hundred thousand dollars, for which moneys so to be borrowed, they shall issue transferable certificates of stock, redeemable at the pleasure of the state, at such time, between the year one thousand eight hundred and fifty, and the year one thousand eight hundred and seventy-five, as the said commissioners of the canal fund may determine, to be paid out of the said fund, and transferable at such place or places, as in the opinion of the said commissioners of the canal fund, shall best promote the interest of the state: They shall pay the sums so borrowed to the canal commissioners, or their orders, for the purpose of making the canals herein before described, under such regulations and restrictions, as the commissioners of the canal fund may deem necessary and proper, in order to secure the faithful application of the money to the making of the canals, and a regular and correct manner of accounting, by the canal commissioners for all sums so paid to them: They shall recommend from time to time, to the Legislature, the adoption of such measures as they may think proper for the improvement of the said fund, and report to the General Assembly, at the commencement of every session thereof, the state of said fund, and their proceedings under this act, and keep a full and perfect account thereof; they shall have power to appoint an agent or agents within or out of this state, to facilitate the obtaining of loans and the transfer of stock, and all other operations relating to the obtaining loans, and the payment of interest thereon, and generally the commissioners of the canal fund, shall have power to make all such arrangements relative to obtaining loans, and the payment of interest thereon, the transfer, transmission and deposit of moneys, as they may deem conducive to the public interest.

Sec. 5. That for the payment of interest, and the final redemption of the principal of the sums of money to be borrowed under the provisions of this act, there shall be, and are hereby irrevocably pledged and appropriated, all the nett proceeds of tolls collected on the canals herein described, and of the rents and profits of all works and privileges, connected with, or appertaining to said canals, and belonging to the state; also, the sum of forty thousand dollars out of the moneys now remaining in the treasury of this state, and thirty thousand dollars out of the revenue to be raised for the year eighteen hundred and twenty-five; in like manner there shall be, and are hereby pledged and appropriated, the following sums, for the several years herein after named, which shall be raised by levying and collecting for each of said years such tax on all the property in this state, entered on the grand list, and taxable for state purposes, as will produce exclusive of defalcations and expenses of collection, the sum hereby appropriated for each year; that is to say, for the years eighteen hundred and twenty-six, and eighteen hundred and twenty-seven, respectively, such sum in each of those years as will be sufficient to meet the interest due for each year on all loans, obtained by virtue of this act; for the year eighteen hundred and twenty-eight, such sum as will produce, together with the nett profits of the canals actually collected, and paid into the treasury for the previous year, an amount sufficient to meet the interest payable for the year eighteen hundred and twenty-eight, on all sums to be borrowed by virtue of this act; and also, the sum of ten thousand dollars in addition thereto; for the year eighteen hundred and twenty-nine, such sum as will produce, together with the nett profits of the canals, actually collected and paid into the treasury for the preceding year, an amount sufficient to meet the interest payable for the year eighteen hun-

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY, BY JOHN KILBOURN, AT \$3 A YEAR, IN ADVANCE.

VOL. I. COLUMBUS, OHIO, SATURDAY, AUG. 30, 1828.

NO. 11

Readers will notice that the Canal Documents are continued on the third page of every number, from the last page of the preceding number.

In the present number, we have completed the publication of all the Ohio Canal Documents, relating to the first era of our canal history: namely, down to, and including the Law authorizing the construction of the Canal, and pledging the faith of the state for the expenses thereof.

On the present occasion, the following extract from a report of the New York Canal Commissioners, of March 1812, is not deemed inappropriate. It is supposed to be from the pen of the late Gouverneur Morris; and is one of the most splendid specimens of fresh imagery and gorgeous eloquence, which we have ever noticed. The views therein contained are equally applicable to the state of Ohio, as to New York.

"Standing on such facts, is it extravagant to believe that New York may look forward to the receipt (at no distant period) of one million dollars net revenue from this canal. The life of an individual is short. The time is not distant when those who made this report will have passed away. But no term is fixed to the existence of a state; and the first wish of a patriot's heart is that his own may be immortal. But whatever limit may have been assigned to the duration of New York, by those eternal decrees which established the heavens and the earth, it is hardly to be expected that she will be blotted from the list of political societies before the effects here stated shall have been sensibly felt. And even when, by the flow of that perpetual stream which bears all human institutions away, our constitution shall be dissolved and our laws be lost, still the descendants of our children's children will remain. The same mountains will stand, the same rivers run. New moral combinations will be formed on the old physical foundations, and the extended line of remote posterity, after a lapse of two thousand years, and the ravage of repeated revolutions, when the records of history shall have been obliterated, and the tongue of tradition have converted (as in China) the shadowy remembrance of ancient events into childish tales of miracle, this national work shall remain. It shall bear testimony to the genius, the learning, the industry, and intelligence of the present age."

A controversy has been carried on between Baltimore and Washington, relative to the Baltimore and Ohio Rail Road. Our readers are aware that the company for forming this road, and the Chesapeake and Ohio Canal Company, came early into collision with each other. It is to be feared too, that their collisions are not at an end. They are in some measure rival works, at least each are candidates for popular favor. The lines of the respective improvements will run parallel to each other for a considerable part of the route; at other places they will be brought forcibly in contact, and with a predisposition, or at least some disposition on the part of the managers and directors to jostle each other as much as possible. Should the works be completed, to which strong determination now exists, the comparative value of rail-roads and canals will be set at rest by the competition which will doubtless be offered and entered into.—This will unquestionably be a very desirable thing, but we regret the magnitude of the experiment. A failure of either project would be too extensively disastrous. The loss would be immense, not only to individuals, but to the cause of improvement generally, and of course the risk of engaging in the undertaking is proportionately great. Seriously we should suppose that even now it would be wisdom for one or the other to give way.—*Penn. Gaz.*

We understand that the Corps of Engineers under Major Wilson have progressed with the rail road from Columbia to Philadelphia, as far as the Gap at the Mine Ridge, a distance of about thirty miles, which completes the location of the Western division of the road. The Canal Commissioners will meet on the 10th of August. At that period Major Wilson will present his report and estimates for this division. The party is now engaged in locating the eastern division, from the Mine Ridge to Philadelphia, and are at present in Chester Valley, having located about five miles of the eastern division.—*Dem. Press.*

THE CANAL.—Mr Harris and party, who have been engaged for some weeks in locating the Canal from this place to Johnston, arrived here on Monday last, having completed the location to within one mile of that town. We understand the line is continued on the Westmoreland side of the river about 12 miles above this town, where it crosses by an aqueduct—there will be four dams, two in passing the Chesnut Ridge and the other two at Laurel Hill. Where the canal on this side of the mountain will terminate, is not yet known, whether at Johnstown or higher up.

Blairsville Penn. Record.

Steam Carriage.—It is stated that a steam carriage for the conveyance of goods, will be started between Southampton and London in a few days. The vehicle will carry about six tons at once, and the consumption of coal and water during each journey will be six bushels of the former and sixty gallons of the latter.—The propelling power will be about the rate of six miles an hour.—*Southampton Courier.*

Liverpool, June 14.—*The Railway Tunnel.*

On Saturday last the final communication between the shafts of the Railway Tunnel was effected; and there is now an uninterrupted passage from the intended depot near Wapping, to the deep cutting at Edge-hill. This magnificent work is about 2200 yards in length, 22 feet wide, and 16 feet high; it is almost entirely cut through the solid rock which in several instances is so shattered and broken, and occurs in such thin beds, or layers, as to render it necessary to insert an arch of brick work for the security of the roof. The droppings of the water, which issued in many places through the pores of the rock, have been successfully stopped by the application of Roman cement. We understand that preparations are making for lighting it with gas, and when this is done, the public will be admitted to a sight of it. It is expected that there will be a sufficient current of air from the bottom to the top, to answer all the purposes of ventilation. Looking at the extent and magnitude of this undertaking, with all the difficulties inseparable from such a work, and considering that it is little more than eighteen months since it was commenced, (during which time no less than 160,000 tons of stone have been removed from beneath the surface, and made subservient to the purposes of improvement above), we cannot but be astonished at the rapidity of the operations which have effected it. We regret to say that the opening of the final communication on Saturday evening was attended with an accident of rather a serious nature. So eager were the miners (who had been laboring many a weary hour within the sound of each other's blows) to put an end to their toil and anxiety, and receive the reward promised to their exertions, that they forgot the caution which was necessary on such an occasion. The men on one side had prepared a blast, and had called to their fellow workmen on the other side to warn them of it, but in the bustle of the moment the call had not been heard, and so slight was the partition between them, that on the blast going off, it forced its way completely through, and three men (one of whom was an intelligent superintendent, who was directing the operations) were considerably burnt by the gunpowder; but we are glad to find that they are all likely to recover. *Billing's Advertiser.*

GEAUGA COUNTY.

A friend has favoured us with the following statistics of Geauga county, which we take pleasure in laying before the public. It is doubtless correct; and in our opinion is strong evidence of the industry and enterprise of our citizens and of the increasing

wealth and prosperity of this section of country.

The *Gauga Iron Company* was formed in April 1825. They erected a Furnace which went into blast in December of the same year, and has since continued in successful operation, making more than 700 tons of metal annually. About two thirds of this is moulded into stoves, Hollow Ware and other Castings, and the remainder into Pigs, the nett value of which will amount to more than \$33,000 yearly. The Company employ an average of from 70 to 80 men, in the different branches of their business, and about 20 teams. They have an Engine for boring and turning Cannon, Steam-boat machinery, &c. In addition to their Blast Furnace, they have a Cupola Furnace, and are the proprietors of a Grist Mill, two Saw Mills and a Fulling Mill, all of which are in the immediate vicinity of Painesville.

There are also in this neighbourhood, three other Furnaces, viz: the Concord Furnace, erected by Messrs. Field and Sanborn, and now owned by Messrs. Field, Stickney, & Co.; the Rail Road Furnace, erected by Messrs. Thorndike and Drury, and now occupied by Messrs. Sealey, Morley & Co.; and the Erie Furnace, erected and owned by Messrs. Root & Wheeler, all of which are in successful operation.

If we estimate the three last named furnaces to produce as much Iron as the former, (and it is believed they will fall but little short,) we find the nett product exceeds \$130,000 annually. Add to this the amount of Bar Iron manufactured at seven Forges, already in operation in this vicinity, and we may safely calculate that the amount of sales in the articles of cast and wrought Iron only, will exceed \$160,000 annually. Above one half of these sales are made in the state of New-York, and the balance in this State, the western part of Pennsylvania, and Michigan. The quality of the metal for machinery and stove plates, is inferior to none, and the Bar Iron is excellent.

The above view of the mineral riches of our county, added to the fertility of her soil for agricultural purposes, the extent of our manufactures and water privileges, the facilities for transportation, and the industry and enterprise of our citizens, give the strongest assurance that Geauga will become one of the wealthiest counties in this rich and flourishing state.—*Gauga Gazette.*

OHIO MAPS.

The editor of this paper has lately revised his Maps of the state of Ohio,—one large, upon the scale of 10 miles to an inch;—the other small, being drawn upon a scale of 40 miles to the inch; so that it is but little more than six inches square. It is beautifully engraved, and printed on bank note paper. Price 18½ cents; or 12 cents if several are taken together.—Price of the larger ones \$1 50 each; or one dollar if several are purchased together. The canal routes are correctly delineated on both.

dred and twenty-nine, on all sums to be borrowed by virtue of this act, and also, the sum of twenty thousand dollars in addition thereto; for the year eighteen hundred and thirty. such sum as will produce, together with the nett profits of the canals, actually collected and paid into the treasury for the preceding year, an amount sufficient to meet the interest payable for the year eighteen hundred and thirty, on all sums to be borrowed by virtue of this act, and also, the sum of thirty thousand dollars in addition thereto; for the year eighteen hundred and thirty-one, such sum as will produce, together with the nett profits of the canals, actually collected and paid into the treasury for the preceding year, an amount sufficient to meet the interest payable for the year eighteen hundred and thirty-one, on all sums to be borrowed by virtue of this act, and also, the sum of forty thousand dollars in addition thereto; and for the years eighteen hundred and thirty-two and each of the years next succeeding, until the expiration of three years after the completion of the canals, hereby authorized to be made, such sum annually as will produce together with the nett proceeds of the canals, actually collected and paid into the treasury, for each year, a sum sufficient to meet the interest payable for such year on all sums which shall have been borrowed by virtue of this act; and also, the sum of forty thousand dollars yearly and each of said years in addition; and for each succeeding year thereafter, such sum s will produce, together with the nett profits of the canals, actually collected and paid into the treasury for each year, an amount sufficient to meet the interest payable for such year, on all loans which may have been made by virtue of this act; and also, the sum of twenty five thousand dollars, for each year in addition, until the said several surplus sums, over and above the amount required to pay the interest on loans, will form a fund sufficient for the redemption of the principal sums to be borrowed under the provisions of this act, when said several sums shall become redeemable; or until the nett profits of the canals shall produce the said sum of twenty-five thousand dollars per annum, over and above the amount required to pay the interest on all sums which shall have been borrowed by virtue of this act; and it is hereby made the duty of the auditor of state, from time to time, to determine the rate per centum necessary for each ensuing year, to be levied on the assessed value of the taxable property entered on the grand list for taxation, within the state, in order to raise the several sums hereby pledged and appropriated to the canal fund for those years, and he shall certify the said rate per centum, and transmit the same to the several county auditors within the state from year to year, in season to enable them to assess the tax for the proper year; and the said tax hereby levied shall be assessed and collected each year by the proper officers accordingly, in addition to the taxes which may from time to time be authorized by the General Assembly for defraying the ordinary expenses of government and for other purposes; and the faith of the state is hereby pledged, that the tax hereby levied shall not be altered or reduced, so as to impair the security hereby pledged for the payment of interest, and the final redemption of the principal of the sums to be borrowed by virtue of this act; and that no tax shall ever be levied by the Legislature, or under the authority of this state, on the stock to be created by virtue of this act, nor on the interest which may be payable thereon; and further, that the value of the said stock shall be in no wise impaired by any Legislative act of this state.

Sec. 6. That the sum of money hereby specifically pledged and appropriated, together with the nett proceeds of all tolls, and of the rents and profits of all works and privileges connected with said canals, shall be paid into the state treasury, and shall be kept distinct and apart from the other moneys belonging to the state, and the accounts thereof shall be entered by the treasurer, in a separate book, to be kept for that purpose, and all moneys

appropriated or pledged, that now are, or that hereafter shall be paid into the treasury for, or on account of the canal fund, shall be paid over by the treasurer of state on the order of the commissioners of the canal fund.

Sec. 7. That the canal commissioners shall be authorized to receive from time to time from the commissioners of the canal fund, such moneys as may be necessary for, and applicable to the objects hereby contemplated under such rules and restrictions, and on such security as the commissioners of the canal fund may deem necessary and proper, and to cause the same to be expended in the most economical manner, in all such works as may be proper to make the said canals; and on completing any part or parts of the works or canals contemplated by this act, to establish reasonable tolls, and adopt all measures necessary for the collection and payment thereof to the commissioners of the canal fund; and the said canal commissioners shall report to the Legislature at each session thereof, the state of said works with an account of expenditures, together with their proceedings under this act, and recommend such measures as they may think advisable for the objects intended by this act; and likewise, when called upon by the Governor, to report to him from time to time, such information as he may require.

Sec. 8. That it shall and may be lawful for the said canal commissioners, and each of them by themselves, and by any and every superintendent, agent and engineer employed by them to enter upon, and take possession of, and use all and singular any lands, waters, streams and materials, necessary for the prosecution of the improvements intended by this act; and to make all such canals, feeders, dykes, locks, dams and other works and devices as they may think proper for making said improvements; doing nevertheless, no unnecessary damage; and that in case any lands, waters, streams or materials taken and appropriated for any of the purposes aforesaid, shall not be given or granted to this state, it shall be the duty of the canal commissioners, on application being made to them by the owner or owners of any such lands, waters, streams or materials, to appoint by writing not less than three nor more than five discreet disinterested persons as appraisers, who shall before they enter upon the duties of their appointment, severally take an oath or affirmation, before some person authorized to administer oaths, faithfully and impartially to perform the trust and duties required of them by this act, a certificate of which oath or affirmation, shall be filed with the secretary of the canal commissioners, and it shall be the duty of said appraisers or a majority of them, to make a just and equitable estimate and appraisal of the loss or damage, if any over and above the benefit and advantage to the respective owners and proprietors, or parties interested in the premises, so required for the purposes aforesaid, and the said appraisers or a majority of them shall make regular entries of their determination and appraisal, with an apt and sufficient description of the several premises, appropriated for the purposes aforesaid, in a book or books, to be provided and kept by the canal commissioners, and certify and sign their names to such entries and appraisal, and in like manner certify their determination as to those several premises which will suffer no damages, or will be benefitted more than injured by or in consequence of the works aforesaid, and the canal commissioners shall pay the damages so to be assessed and appraised, and the fee simple of the premises so appropriated shall be vested in this state: *Provided, however,* That all such applications to the board of canal commissioners for compensation for any lands, waters, streams or materials so appropriated, shall be made within one year after such lands, waters, streams, or materials shall have been taken possession of, by the said commissioners, for the purposes aforesaid.

Sec. 9. That every person actually engaged in laboring on either of the canals, authorized by this act, shall be exempt from doing militia duty, in

the state, except in cases of insurrection, or invasion during the time he is actually engaged, and the certificate of one of the canal commissioners, or contractors, who shall employ such men so liable to perform militia duty in performance of their contracts, shall be prima facie evidence of such engagement, and no acting commissioner, or principal or assistant engineer employed on either of said canals shall be liable to be taken by capias or warrant in any civil suit, arising out of, or connected with their official duties, but that such persons may be proceeded against by summons in all such cases.

Sec. 10. That the said canal commissioners or a majority of them shall be, and they are hereby authorized to make application in behalf of this state, to the Congress of the United States, and to the proprietors of lands through or near which the said canals, or either of them be proposed to pass; to all bodies politic, or corporate, public or private; and all citizens, or inhabitants of this or any other of the United States for cessions, grants, or donations of land, or money, for the purpose of aiding in the construction of both or either of said canals, according to the direction of the several grantors or donors, and to take to this state, such grants and conveyances, as may be proper and competent, to vest a good and sufficient title in the said state, to the lands so to be ceded, or granted as aforesaid.

Sec. 11 That it shall be the duty of the canal commissioners, on or before the first Monday of December, in each and every year, to settle and account with the commissioners of the canal fund, for all moneys received by them, from the commissioners of the canal fund, and it shall be the duty of the commissioners of the canal fund, to report the settlement so made to the Legislature, as soon thereafter as may be, detaining the sums allowed by them to the engineers, agents and laborers respectively employed in the superintendence and construction of said canals, and the works connected therewith.

M. T. WILLIAMS,

Speaker of the House of Representatives.

ALLEN TRIMBLE.

February 4, 1825.

Speaker of the Senate.

The vote of the General Assembly of the state of Ohio, on the final passage of the foregoing act, stood as follows, namely: [See Journal of the Senate, for 21st January, 1825, page 254.]

IN THE SENATE.

YEAS,

Messrs John Augustine,
Edward Avery,
Z. A. Beatty,
D. H. Beardsley,
Ebenezer Buckingham, jun.
Samuel Caldwell,
Jacob Catterlin,
Jacob Claypool,
Joel Collins,
David Cronse,
Ephraim Cutler,
Owen T. Fishback,
George Fithian,
Joseph Foos,
Nathan Guilford,
Samuel H. Hale,
David F. Heaton,
David Jennings,
Thomas Kirker,

YEAS.

Messrs Henry Laffer,
Robert Lucas,
William Manning,
George Newcomb,
Aaron Norton,
David Shelby,
Matthew Simpson,
David Sloane,
William Stanbery,
Clayton Webb,
Samuel Wheeler,
Daniel Womeldorf,
Jabez Wright,
Robert Young,
Allen Trimble, *Speaker*—34.

NAYS.

Messrs William Gass,
Daniel Harbaugh—2.

In the House of Representatives, the vote was as follows:—[See Journal of the House of Representatives, for the 28th of January, 1825, page 318.]

YEAS.

Messrs Isaac Atkinson,
John Bigger,
Jacob Blickensderfer,
William Cary,
Leonard Case,
William Collings,
Isaac Cook,
William Coolman,
Matthias Corwin,
John Cotton,
Samuel Coulter,
Edmond Dorr,
John Dougherty,
Jeremiah Everett,
Richard Fallis,
Thomas Flood,
Jacob Frederick,
Thomas Gatch,
John M. Gray,
Thomas Hanna,
Robert Harper,
Batteal Harrison,
David Higgins,
Homer Hine,
George B. Holt,
Andrew V. Hopkins,
Thomas Irwin,
Thomas King,
Joseph Kyle,
James W. Lathrop,
Philip Lewis,
John Liest,
Jacob Lindsey,
John Lucas,
Alexander M'Connell,
John M'Cooke,

YEAS.

Messrs Samuel M'Henry,
John Means,
David Mitchell,
Edward L. Morgan,
Elias Murray,
Joseph Olds,
Thomas L. Pierce,
Thomas Rigdon,
James Robinson, *of Coshocton*,
James Robinson, *of Wayne*,
Joseph W. Ross,
Almon Ruggles,
Thomas Shannon,
James Shields,
Robert F. Slaughter,
Stephen C. Smith,
Adam Swan,
John Turner,
William Wiley,
George W. Williams,
Thomas Worthington,
M. T. Williams, *Speaker*—58.

NAYS.

Messrs William Blackburn,
Ephraim Brown,
George Brown,
John Cochran,
John Davenport,
George Edwards,
William Hamilton,
James Hedges,
John Hubbard,
William Lowry,
William E. Russell,
John Shelby,
Jacob Ward—13.

 ADDITIONAL REPORT OF THE CANAL COMMISSIONERS.

1st February, 1825.

TO THE GENERAL ASSEMBLY OF THE STATE OF OHIO,

Agreeably to the requisitions of the act to provide for ascertaining the practicability of connecting Lake Erie with the Ohio river, by means of a navigable canal, the board of commissioners now lay before your honorable body, a statement of the expenditures during the last year, under the provisions of that act and the acts supplementary and amendatory thereto. The presenting of this statement has been delayed in order to procure detailed accounts of the disbursements made by engineers in the employ of the board. These engineers, since closing their labors in the field, have been so constantly employed in making plats, profiles and estimates of the lines located by them during the past season, that they have been unable sooner to prepare their accounts.

From the statement now laid before the General Assembly, it will appear that the expenditures of the last season, have exceeded the sum appropriated by the last General Assembly, together with the unexpended balance of former appropriations, two thousand four hundred eighty-two and fifty-five and three fourths hundredths dollars. This is attributable to the circumstance of there having been located a much greater length of canal and feeder lines than was anticipated, and the consequent employment of a greater length of time, and number of engineers, surveyors and hands, than was anticipated and furnishing them with the necessary implements and means of subsistence.

One entire line extending from Portsmouth, on the Ohio, to the mouth of Black river, on the Lake, (with the exception of that part of the line extending from the mouth of Tomaka, to the Killbuck summit, which was located the previous season,) a line extending from Coshocton, to Cleaveland, on the Lake, by the way of Tuscarawas and Mahoning; and the Columbus, Racoon and North fork of Licking feeders, and an extra line from the Pickaway Plains, to the neighborhood of Chillicothe, have been carefully located, surveyed and staked out, during the last season. An entire line extending from Cincinnati, to the foot of the Maumee rapids, with the feeders from the Mad and Miami rivers, and an extra line extending from Cincinnati, northwardly about ten miles, have been located, surveyed and staked out with equal care, making an aggregate length of canal and feeder lines located during the past season, of six hundred and seventy miles.

We believe that the history of canalling, furnishes no instance of an equal length of line having been located, and the expenses of constructing a canal thereon, estimated, in the same length of time, nor at so small an expense. There was located in New York, in the year 1816, about four hundred miles of canal line; this was accomplished for sixteen thousand nine hundred thirty-seven dollars—a sum nearly equal to the whole cost of our examinations, surveys and locations for three years; in which eight hundred miles of line have been actually located and staked out on various routes, and at least two thousand miles of random levelling have been performed.

To ascertain the amount actually expended in making our examinations and surveys, it will be proper to deduct from the aggregate amount of disbursements, the value of the levelling and surveying instruments, teams, baggage wagons, tents and camp furniture and equipage, now remaining on hand—the property of the state. As all these articles will be necessary in the further prosecution of the work, it was thought inexpedient to subject the state to the loss consequent on the sale of these articles and the repurchase of the same or similar ones.

It will be necessary, in order to meet the several balances due for the last year's service, to make an appropriation equal to their amount; and we would respectfully recommend a further appropriation of three thousand dollars, to be paid to the commissioners of the canal fund, in order to provide for expenses of making the surveys and examinations preparatory to the actual commencement of the work, to be refunded to the state, out of the first loans negotiated by the commissioners of the canal fund.

All which is respectfully submitted,

T. WORTHINGTON,
E. BUCKINGHAM, Junr.
ISAAC MINOR,
N. BEASLEY,
ALFRED KELLEY,
M. T. WILLIAMS.

Columbus, February 1, 1825.

Extract from the Journal of the House of Representatives, of Feb 1st, 1825.

The joint committee of claims to whom was referred the accounts of the canal commissioners,—beg leave to report:

That they have examined the said accounts and vouchers thereto relating, and are satisfied of the fairness and accuracy of said accounts, viz: That services have been rendered by the acting commissioners, engineers, hands, laborers and assistants, to the amount of six thousand five hundred and seventy-three dollars sixty three cents; that said commissioners and engineers have paid out for incidental expenses, thirteen hundred thirty-three dollars thirty cents; and for provisions and other out fit property, seventeen hundred fifty-two dollars; and for incidental expenses (including one levelling instrument, eighty dollars,) one hundred twenty-seven dollars thirty-eight cents: making together nine thousand seven hundred eighty-six dollars thirty-two cents; and that the appropriations subject to the order of said commissioners, is seven thousand two hundred and fifty one dollars and forty-five cents; and that said commissioners have sold sundry articles of property to the amount of fifty-two dollars seventeen cents: and which leaves a balance due as stated in the account of the said commissioners two thousand four hundred eighty-two dollars fifty-five cents, to the persons therein stated to be provided for by legislative provision. They therefore recommend that an appropriation be made by law, sufficient to pay the sum aforesaid.

State of Ohio in account current with the Board of Canal Commissioners.

1825.

DR.

January,	To cash paid for out-fit and subsistence, as follows:	
No. 1	By A. Kelley as per his account rendered,	167 05
2	M. T. Williams,	183 79
3	Samuel Forrer,	457 70
4	William H. Price,	282 65
5	John Forrer,	468 26
6	Byron Kilbourn,	113 54
7	Isaac Minor,	79 00
		<hr/> 1752 00

To cash paid Expenses of Commissioners and Engineers:

No. 1	By A. Kelley as per account rendered	319 39
2	M. T. Williams,	267 33
3	Samuel Forrer,	114 45
4	David S. Bates,	196 45
5	William H. Price,	63 00
6	John Forrer,	47 33
7	Byron Kilbourn,	20 00
8	Richard Howe,	39 12
9	Jesse L. Williams,	20 00
10	Francis Cleaveland,	38 28
11	Isaac Minor,	10 87
12	Benjamin Tappan,	63 00
13	N. Beasley,	63 56
14	E. A. Brown,	75 50
		<hr/> 1333 30
		<hr/> \$3085 30

1825

DR.

Cash paid for incidental expenses, as follows:

No. 1	By A. Kelley, as per account rendered,	7 50
2	M. T. Williams,	39 78
3	Samuel Forrer,	80 00
		<hr/> 127 38

Cash paid for Salary and Wages, as follows:

No. 1	To A. Kelley, as per his account,	723 00
2	M. T. Williams,	783 00
3	David S. Bates,	865 75
4	Samuel Forrer,	750 00
5	William H. Price,	645 00
6	John Forrer,	4 8 00
7	Richard Howe,	300 00
8	Francis Cleaveland,	233 66
9	Byron Kilbourn.	439 50
10	For sundry wages paid to chairmen, axemen and other hands, by A. Kel- ley, M. T. Williams, W. H. Price, Samuel Forrer and John Forrer as per their accounts rendered,	1395 72
		<hr/> 3657 63

Total amount expended,

\$9786 32

1825

Jan. 31, To balance, 2482 55

1824

CR

January 28th, By appropriation of 1823 remaining unex-
pended,

1251 45

ditto 1824,

6000 00

Balance of A. Kelley's account,

16 38

do. S. Forrer,

2 67

2 barrels flour sold to Doct. Goodale,

8 00

1825 Balance due from Isaac Minor on acct. of cattle, 25 12

Jan. 31 By balance, being the amt. due on the following accts.

To A. Kelley. as per acct.	20 46
David S. Bates,	1052 20
N. Beasley,	63 56
William H. Price,	302 94
Richard Howe,	105 10
Byron Kilbourn,	198 94
Francis Cleaveland,	146 25
J. Robinson on acct. of John Forrer and J. L. Williams as per his bills,	41 83
Due Franklin Bank of Columbus,	51 23

Error in accounts,

13

On the 4th day of February, 1825, Messrs Alfred Kelley, Micajah T. Williams, Thomas Worthington, Benjamin Tappan, John Johnson, Isaac Minor, and Nathaniel Beasley, were appointed canal commissioners, by joint resolution of the Senate and House of Representatives.

And, by an act passed on the same day, and heretofore inserted, Ethan A. Brown, Ebenezer Buckingham, jun. and Allen Trimble, were appointed canal fund commissioners.

MEMORIAL AND RESOLUTIONS.

To the Senate and House of Representatives of the United States, the memorial of the Legislature of Ohio respectfully represents,

That the commissioners appointed by the Legislature, to make certain specific examinations, with respect to the practicability of connecting Lake Erie with the Ohio river, by means of canal navigation, have completed the duties assigned them; they have located two lines of canal. The one commencing at the mouth of the Scioto river, and terminating at Lake Erie, either at the confluence of the Cuyahoga or Black river, as may be found the most eligible. The other line of canal commencing at the city of Cincinnati, and terminating at the foot of the rapids of the Miami of the Lake. It is deemed unnecessary in presenting this interesting subject to the notice of the national councils, to dwell with particular precision on the advantages resulting from its accomplishment. A few observations, however, on the subject may not be considered unimportant. In reference to the lines of canal, located by the canal commissioners of this state, considerations present themselves of an extraordinary character. In a local point of view, the subject presents advantages truly important, but viewed in the character in which it must deservedly stand in point of national interest, its advantages will be incalculable. It will open a speedy, safe and cheap internal communication from Orleans to the Hudson, and to the interior of our northwestern Lakes. The various productions and commodities peculiar to the northern and southern extremities of the Union, will be profitably exchanged. It will materially enhance the value and facilitate the sales of such of the public lands as are near to either of the located routes. In the event of war, its advantages in a national point of view, will be greater than can well be estimated. In short, the citizens of this vast republic, from the twenty-ninth to the forty-seventh degree of latitude, will through this channel of communication be continually holding intercourse with each other for the purposes of trade. A traffic founded upon the principles of reciprocal advantage, not governed by the provisions of a treaty, liable to be changed, or perhaps partial in its operation, but by the permanent provisions of our constitution, which secures to all the same privileges in trade. Thus will the citizens of our Union be benefitted, our manners become assimilated, and in every sense of the word will it serve as a ligament to bind more closely our political Union. The practicability and utility of an undertaking of this kind in the United States, have been now too well tested by experience, to need confirmatory arguments in its favor, without noticing particularly such canals as are now in full operation in the United States—the almost entire completion of the New York canal, considered either in reference to the astonishing magnitude of the undertaking—the shortness of time in which it will have been accomplished—its eminent advantages and the amount of toll which it already produces, stands as a monument to the world of what energy and enterprise may accomplish, in works of this kind, and what are the benefits derivable from them, when completed. In speaking of the funds for the accomplishment of the splendid undertaking about to be commenced in Ohio—suffice

It to say, that the almost entire reliance of the state for raising the revenue to meet the expenses of government, has been by a tax on property. This must still continue to be our main reliance to meet the current expenses, and likewise the source from which a revenue will be raised to discharge the interest on loans procured for the accomplishment of our canal project. Our remote situation from foreign market, the low price of almost every article of produce, and the consequent scarcity of money, are points which have been well considered; they present difficulties, but not such as are insurmountable. A vigorous effort will carry us through—relying on the enterprise, industry, liberality and perseverance of our citizens, we harbor not a doubt, but that we shall be able to raise a revenue sufficient to meet with punctuality the interest on whatever loans may be necessary for the completion of the work. The Legislature of Ohio have deemed it nothing more than proper, in presenting this important subject to the consideration of Congress, to mention its practicability, its local and national importance, together with the prospect of its accomplishment, being satisfied that the representatives of this extensive republic, will feel an interest in the prospects and prosperity of every portion of the Union. It may be also proper to state that the western line of canal passes through lands owned by the United States, from the southerly boundary line of the Piqua district to Defiance, in the county of Williams, near the line dividing the counties of Mercer, Vanwert, Paulding and part of Williams on the west, and part of Henry, Putnam, Allen, and part of Shelby on the east. From Defiance it passes through the counties of Henry and Wood to the Maumee bay.

The quantity of lands owned by the United States in the counties above named, is estimated at three millions of acres. to this quantity may be added five hundred and fifty thousand acres in the counties of Hancock and Hardin, lying east and adjoining the counties of Putnam and Allen, making an aggregate of three millions five hundred and fifty thousand acres, lying upon the line and in the vicinity of this canal. We have not the means by which we can ascertain with perfect accuracy, the quantity of lands which may have been sold in the tract above described, but from the best information we possess, the quantity of public lands remaining unsold in the above mentioned counties will rather exceed than fall short of the above estimate. This, however, may be ascertained with more precision at the General Land Office. The length of canal line as located from the southerly boundary line of the Piqua district, to the Maumee bay, is one hundred and twenty-two miles.

Besides the immediate sales of the Government lands above alluded to, which would be induced by the construction of this line of canal, the public lands in the state of Indiana, lying upon the western boundary line of this state, which have not as yet been offered for sale, would be much increased in value, and command an enhanced price when they shall be brought into market.

We have no data before us, by which we can ascertain the quantity of public lands in the vicinity of the other line of canal, and for this must beg leave to refer to the records in the General Land Office.

Another consideration we think deserving of notice—the Legislature at the present session have deemed it expedient entirely to change the revenue laws of the state, abandoning the system of classing lands for taxation, and adopting that of an ad valorem assessment. This we have deemed the more necessary, that the lands lying in the vicinity of the canals, the value of which will be greatly increased, may be charged with tax in proportion to their enhanced value. The lands owned by the United States, although exempt from taxation, and not subject to be charged with tax until the expiration of five years from the time of sale, would, nevertheless be enhanced in value, in an equal ratio with the lands owned by resident proprietors.

This Legislature will not for a moment harbor the suspicion that the Congress of the United States, sharing liberally (as must necessarily be the consequence) the benefits and advantages to be derived from the accomplishment of these canals, will feel a willingness to do so at the entire expense of the state of Ohio, which has so long and so profusely poured her treasures into the national coffers.

We are therefore unwilling to entertain a doubt that Congress will co-operate with us in the prosecution of the enterprise in which we are about to engage, by granting to this state such quantity of the public lands in the vicinity of the respective lines of canal as will answer the demands of justice and promote as well the interest of the Union as of the state of Ohio.

Resolved, That our Senators and Representatives in Congress be requested to use their endeavors in their respective branches to obtain a grant of the public lands to this state, for the purposes mentioned in the foregoing memorial.

And whereas, the canal commissioners have also examined and levelled the Grand river and Mahoning route from Lake Erie to the Ohio river in the eastern part of this state, and found it a practicable and favorable line for the construction of a canal, but as about thirty miles of this canal must necessarily pass within the Commonwealth of Pennsylvania, and is considered as forming a part of the contemplated national canal, from the waters of the Atlantic to the Lakes, it is not embraced in the present canal system of this state—Therefore,

Resolved, That our Senators and Representatives in Congress be requested to forward by every means in their power the examination and location of the said Grand river and Mahoning line of canal by the National Government, at as early a period next season, as may be found practicable.

Resolved. That his Excellency the Governor be requested to forward as soon as he may find it convenient—a copy of the report of the canal commissioners, and also a copy of the foregoing memorial and these resolutions to the President of the United States, the President of the Senate, and the Speaker of the House of Representatives of the United States, and also to each of our Senators and Representatives in Congress.

February 3, 1825.

The foregoing memorial and resolutions were originally drafted and submitted to the consideration of the House of Representatives, on the 5th of January, 1825, by Mr. Bigger, an able representative from Warren county; and are published in the 102, 3 and 4th pages of this volume. From and after the word "Union," however, in the 14th line from the bottom of the 103d page, the present memorial and resolutions are considerably amplified. The editor of this compilation in his first review of the public documents, as contained in the several volumes of the Laws and Journals, preparatory for this publication, had omitted to notice the identity of the present memorial, and that drafted by Mr. Bigger, commencing on the 102 page. The reader is therefore requested to cross out, with a pen or pencil, the memorial headed "Extract" &c. commencing on the 102, and terminating on the 104th page; as being superfluous: it being all embraced, together with some additional matter, in the present memorial and resolutions.—EDITOR.

Extract from Governor Morrow's Message, of the 7th of December, 1825.

The operations of the boards of commissioners appointed by your body at the last session, under the provisions of the act for opening a navigable canal from Lake Erie to the Ohio river, and from Dayton to Cincinnati, have been attended with that success which promises the most favorable result to those grand and important public works. The loan of four hundred thousand dollars, authorized by that law, has been negotiated by the board of commissioners of the canal fund, at an interest little exceeding five per cent. per

annum, but a small part of which will be charged upon the state until the principal shall have been actually expended. The canal commissioners have, within the past season, placed under contract thirty-four miles on the Cuyahoga summit, ten and an half on the Licking, and two and an half on the embankment of the reservoir on that summit, and forty-two miles on the Miami line; making in the aggregate eighty-eight and three quarter miles. To complete those contracts on the different parts of the lines, and which embrace parcels of each variety of works to be performed, will require a sum little short of eight hundred thousand dollars; falling somewhat within the estimate made by the engineer, and reported to the General Assembly at their last session, by the canal commissioners. In the performance of this work, from which, on its completion, a large revenue may with certainty be anticipated, economy would dictate all that prompt exertion and expedition, which would be consistent with the public resources, and the advantageous application of them. But, while on the one hand it should not be unnecessarily delayed, and the state too long subjected to the payment of interest on the funds expended in its partial construction, and before it has become productive; so on the other, it should not be pressed forward so hastily as to render taxation burthensome, or materially increase the price of labor, and thereby add to the expense of the work. It is by pursuing a proper medium that the public interest will be best promoted, and the greatest advantages secured to the state.

It appears that after meeting the existing contracts, there will remain of the loan contracted, and that to be contracted for in the ensuing year, less than the sum of two hundred thousand dollars.—Hence, new contracts could only be made to that amount within the year. It is not doubted, that a much larger sum might be advantageously employed, without at all unfavorably affecting the price of labor. From the present state of the treasury, it is satisfactorily ascertained, that the interest on a loan of one million of dollars, which is four hundred thousand dollars in addition to that now authorized, could be met without a resort to any additional taxation. On every consideration, it would appear proper, that the commissioners of the canal fund, should be empowered to contract for a loan of at least one million dollars in the ensuing year; and it is worthy of consideration, whether, under certain restrictions, policy would not require, that they should have power to contract a loan for the whole amount estimated as necessary to complete the line of canal now directed to be opened. Such power might be used with advantage to the interests of the state; and were the power granted, the commissioners could avail themselves of any favorable state of the money market that should occur. In case a loan to the amount required for completing the whole work should be effected, the interest may be kept within the means the state possesses for its discharge, by contracting for its payment on instalments, and the interest to commence when respectively payable.

The experience of the present year carries with it the strongest and best assurance of the safety in the progress, and perfect success in the final consummation of that important work. A rapidly increasing population—the industry of our citizens—the growing wealth and resources of our country—induce a strong belief, that the undertaking which had been deemed so arduous, may be effected without imposing an inconvenient burthen on community;—while the prospect of incalculable advantages, which it holds forth to the people, and the certain benefit which it will extend to posterity in ages to come, show, that it is an object worthy your earnest attention and fostering care. To the successful progress of the work, however, it is essential that a steady course of policy shall be pursued; that the funds which have been pledged to the object be held inviolate and unimpaired; and that proper accountability and economy be observed in the expenditures.

The propriety is suggested of the appointment of an officer, whose office shall be kept at the seat of government, and whose duty it shall be to receive and settle the accounts of the commissioners of the canal fund, and of the canal commissioners; to enter their proceedings in books to be regularly kept; and to file and preserve all papers belonging to his office—subject to the inspection of the Legislature.

FIRST REPORT OF THE CANAL FUND COMMISSIONERS.

10th of December, 1825.

TO THE GENERAL ASSEMBLY OF THE STATE OF OHIO,

The commissioners of the canal fund, appointed by the act of the 4th of February, 1825, "to provide for the internal improvement of the state of Ohio, by navigable canals," respectfully report,

That in pursuance of the authority vested in them, and to furnish the canal commissioners with pecuniary means to prosecute the work committed to their charge, the commissioners of the canal fund, advertised in the cities of Baltimore, Philadelphia, New York and Boston, inviting proposals to be made to them in New York, on the fifth day of last April, for a loan of four hundred thousand dollars.

The most favorable offer having been made by Messrs Lord and Rathbone, of New York, a contract was accordingly concluded with them, which stipulated, that they should advance \$390,000, in three instalments, as follows, viz: ten per cent. or \$39,000, to be paid at the time of contracting; forty per cent. or 156,000, on the first of August; and fifty per cent. or \$195,000, on the first of November, ensuing; for which they were to receive certificates in evidence of the debt to the amount of \$400,000, bearing an interest of five per cent. per annum, payable semi annually at the Manhattan Bank, in the city of New York, on the first days of January and July; the stock to be transferable at this office, and the principal redeemable at the pleasure of the state, after the first of January, 1850; the payments being at the rate of \$97½, for every \$100 of stock certified as above mentioned; the interest commencing on each instalment when paid, and the certificates for discount of 2½ per cent. or \$10,000, to draw interest from the third day of September last. The commissioners have the satisfaction of informing the General Assembly, that the lenders have punctually fulfilled their engagement, and received their certificates.

With a view to the safe and productive disposal of the money when paid in, until it should be required for expenditure by the canal commissioners, the commissioners of the canal fund, made an arrangement with the Manhattan Company, by which that institution was to receive the instalments, and hold them subject to the orders of the commissioners, allowing an interest of five per cent. on such deposits while they should remain undrawn; with this exception, that so long as the deposite should continue, \$20,000, part of it, should be exempt from a charge of interest; as a compensation for the agency of the Bank, in receiving money, paying interest, issuing and registering certificates and transfers, keeping all the books and accounts, and, in general, transacting all the business appertaining to the agency. The funds furnished by the canal fund, on the requisition of the canal commissioners, amount to \$184,000, of which \$141,000, have been raised by drafts upon the deposite in New York, drawn to become payable as follows: \$5000 on the fifth of December, instant; \$55,000, on the first of January; and \$81,000, on the first of February next. The balance against the fund, on the interest account, will consequently be less than \$900, on the first of January, 1826.

In relation to expenditures in the operations of the canal commissioners, it was thought advisable to withhold advances from the contractors, in the first place; but to allow them payment, from time to time, for work actually done, in such proportions as the acting commissioners should, in their discretion, deem prudent and proper. For the sake of convenience, and to facilitate operations, as well as to avoid risk and expense in transmitting from New York to Ohio, and to provide for accountability by the best means in their power, the commissioners of the canal fund agreed with the Western Reserve Bank, and the Banks of Lancaster and Columbus, that they should receive, as deposits, drafts on the Manhattan Company, to a limited amount; which sums have been confined to the requisitions on this board by the board of canal commissioners. These banks have hitherto been directed to make payments out of the moneys in their hands, on the orders of an acting commissioner in favor of contractors; requiring each order to be accompanied by the certificate of a resident engineer, that work to that amount had been performed on the contract; or in case of advances to contractors, the contract should be filed in the office of the bank, and payments, not exceeding ten per cent. on the amount of that voucher, made on the order of an acting commissioner in favor of the contractor. No order for advances has yet been drawn.

Agreeably to a requisition of the canal commissioners, of the 7th of February last, the sum of \$3000, appropriated on the 4th of the same month, was paid to their President as a fund to meet the expenses of future surveys, superintendence, &c. and in compliance with subsequent requisitions of the same Board, the further sum of \$10,000, has been placed subject to the order of the acting Commissioners, for the same purpose: the sum of \$1000, has also been placed subject to the order of the President, to defray the expenses of the canal commissioners. An account of these expenses is expected from that board, so soon as the task of preparing their report for the Legislature, shall be accomplished. These accounts, together with that of the expenses of the commissioners of the canal fund, will form the subject of a future communication.

The commissioners are gratified in being able to say that they have generally met with the most encouraging liberality and friendly feeling, in relation to the policy which the state is pursuing; and we feel much pleasure in stating to the Legislature, that some of the institutions in our own state, and especially the Western Reserve Bank, and Ohio Bank of Lancaster, have given every desirable facility to the operations of the board in the transmission of funds from New York to Ohio, while by their accommodating disposition they have saved much labor to the commissioners, and expense to the state; and the deep interest manifested by the gentlemen conducting those institutions, is a sure pledge that every facility consistent with their interest, will be continued in future.

The commissioners have also had great satisfaction in the frank and honorable conduct of the gentlemen who contracted for the loan; and were much gratified to find the policy pursued by the government of Ohio, had placed the credit of the state in such high estimation, as it is held in New York. They have no fears that it will be impaired; but trust they shall find it increased, when they shall attempt to negotiate another loan. Whether they shall be able to obtain the next loan on terms equally advantageous as the last, must necessarily depend on the state of the money and stock markets, which, from their nature, participate, to some extent, in the fluctuations of changing times. The commissioners are far from considering the prospect before them as discouraging. The increased demand for private and temporary loans during a part of the past season, seems to have arisen from transient causes; and not to have made a deep impression on the price of public securities.

Should the report of the canal commissioners present such a view of past operations and future prospects as to convince the Legislature of the expediency of hastening the progress of the magnificent public works; that have been auspiciously commenced, and conducted thus far, with eminent success and ability, it will become necessary to authorize funds to be raised in a shorter time than is contemplated by the act to provide for these improvements; and a corresponding modification of that act will be requisite. The commissioners have reason to believe that an amount equal to the whole estimated cost of the canals could have been borrowed in New York, in the beginning of last April, on terms more favorable to the state than they could obtain on the amount for which they were empowered to contract; and, at that time, the money could have been securely placed, so as to have relieved the canal fund from a great portion of the interest, until the money should be required by the canal commissioners. Whether the commissioners of the canal fund, if vested with extended discretion, would, next year, contract for the whole or for a part of the sum that the canals are estimated to cost hereafter, must depend on several considerations that will be addressed to their prudence at the time of contracting; among these must be reckoned the security and productiveness of the principal while remaining in the canal fund—the value of money and of stocks, and the state of public confidence. In order, therefore, to enable the canal commissioners to adapt the scale of their operations, with good economy, to the state of the country, and afford this board an opportunity to avail themselves of such favorable circumstances as may be presented, the commissioners respectfully recommend that they may be authorized to borrow for the canal fund, at such times as they shall judge proper, a sum equal to the estimate of the future cost of the Ohio canals.

The commissioners have understood that donations, mostly in land, to the value of more than \$15,000, have been obtained for the canal fund by the acting commissioners. The complete list not having been received, the commissioners ask leave to refer the General Assembly to a future communication, for particulars. The commissioners are not aware of the necessity, at present, of any alteration in the revenue laws relating to the canal fund, which their duty requires them to recommend.

Respectfully submitted,

ETHAN A. BROWN,
E BUCKINGHAM, jun.
ALLEN TRIMBLE.

FOURTH ANNUAL REPORT OF THE CANAL COMMISSIONERS.

10th December, 1825.

TO THE HONORABLE GENERAL ASSEMBLY,

In obedience to the "Act to provide for the internal improvement of the state of Ohio by navigable canals," the board of canal commissioners now respectfully report:

That immediately after the passage of the joint resolution of the last General Assembly, in conformity with the law, appointing commissioners, they met and proceeded to organize the board. Two members of the board, Messrs Williams and Kelley were appointed acting commissioners. The board also appointed David S. Bates, Esq. principal engineer; Samuel Forrer and William H. Price, resident engineers; and made arrangements for as early a commencement of the work as practicable, after they should receive notice of the negotiation of the loan authorized by law for making the proposed canals. The compensation of the acting commissioners, principal engineer, resident and assistant engineers, was also fixed by the board, at the rates contained in the schedule marked A. and herewith transmitted.

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY, BY JOHN KILBOURN, AT \$3 A YEAR, IN ADVANCE.

VOL. I. COLUMBUS, OHIO, SATURDAY, SEPT. 6, 1828.

NO. 12.

Readers will notice that the Canal Documents are continued on the third page of every number, from the last page of the preceding number.

This number has been delayed about two weeks from inability of procuring paper, in due time. But as the principal contents are such as not to be affected by the precise time when actually printed; it has been deemed expedient to date this number, in regular weekly order, the same as if no delay had occurred.

By an article inserted in this days' paper, it will be seen that a society of *Civil Engineers* has been lately incorporated in England. And the suggestion is here ventured, whether it might not be expedient, for the engineers, engaged in the public works now going on in Ohio, to organize themselves into an institute of a similar nature.

By such an organized institution, they would be better able, permanently, to support a periodical work, especially devoted to the benefit and improvement of themselves and others in their profession—a profession destined, very shortly, to become, of at least equal importance with any other in our country.

As this idea is, however, new to the writer, as it probably is to most of our readers, all its advantages cannot be, at once, enumerated: and there may be objections and obstacles in the way of such a measure, which are not, at present, obvious. The hint is only thrown out for consideration.

By the politeness of Mr D. L. Rathbone, a contractor on the canal, we have been politely furnished with a copy of a little work, recently published in London, England, describing the *Thames Tunnel*, illustrated with several engraved views, &c. Any of our readers, who may have the opportunity and wish to see it, can examine it, by calling at this office.

It is with deep regret that subscribers are informed that the publication of this work must be suspended a few weeks; until paper can be procured from a considerable

distance; as it is utterly impossible to procure it from any paper-mill within fifty miles, under a month or six weeks, of the size and quality, which we use. Money will not now procure it. We have repeatedly called upon the dealers in paper, with cash in our hands, but could not obtain it; nor a promise of it short of the above mentioned period. The owners of the two mills, at which we have applied, are now engaged in making certain lots of writing and ordinary printing paper, which they say they cannot leave, under some weeks, even for money in hand.

We have been thus particular, on this head, because, our feelings and interest are so affected by it. Subscribers must put up with this delay; as it is absolutely beyond our control, to have ordered it otherwise.

We suffer, by the delay tenfold more than our subscribers: for the fifty-two numbers, (the number of weeks in a year,) will be furnished, for a year's subscription.

Miami Canal.

The *Western Telegraph*, (published at Hamilton,) says, that "the amount of tolls entered on the Collectors books, at this place, during the last six months," were as follows:

March,	\$294 08 1-2
April,	678 85
May,	737 66 1-2
June,	673 52
July,	649 65
August,	440 11 1-2

\$3,473 88 1-2

"It is believed that the tolls of the six coming months will exceed those which are passed, near 50 per cent. which will give, on the first 44 miles for the first year, near \$10,000."

Steam Coach.

There is a great probability of the steam coach, which has been built by Messrs. Gurney & Co. answering the intended purpose. It was tried on Monday evening, in the square of the horse barracks of the Regent's Park, and performed with great ease, at the rate of from 12 to 14 miles an hour. It is much improved in appearance, being now more light and elegant than when it was first exhibited.—*London paper.*

THE GREAT WESTERN CANAL of New York, affords a continuous and uninterrupted navigation from the Hudson to Lake Erie, and communicates also, by means of a lateral branch, with Lake Ontario, at Oswego. This canal is 363 miles in length; the difference of level between Lake Erie and the Hudson is 564 feet; but the canal may be considered as divided into two great but unequal sections, one deriving its waters from Lake Erie, and the other from a summit level in the vicinity of Utica. Lake Erie is made use of as a principal feeder from the mouth of the canal as far as Montezuma, on Lake Cayuga, a distance of 167 1-2 miles. The descent is 190 feet, by means of twenty-one locks. Beyond this point the canal rises 62 feet by means of seven locks to the summit level; this extends for a distance of 69 miles of level and uninterrupted navigation. The descent to the Hudson is by 53 locks, twenty of which lie within the space of a few miles in the vicinity of the Cohos, or Great Falls of the Mohawk near its junction with the Hudson. Besides the lesser aqueducts and culverts by which this canal is carried over smaller streams, it crosses the Genesee River by an aqueduct of nine arches of 50 feet span, and the Mohawk, twice by aqueducts of 748 and 1,183 feet in length respectively.

The cost of this great work, up to the time it was opened for navigation, was nearly nine millions of dollars; seven millions and a half of which were raised by a loan, for the payment of the principal and interest of which, the faith of the state was pledged, along with the receipts of several branches of the revenue. These produce about ten per cent upon the amount borrowed, and hence ensure the liquidation of the debt within the period by no means remote. Thus, then, had the tolls on the canal been barely sufficient to keep it in repair, the construction of it was entirely within the reach of the ordinary resources of the state. But at the moment of its completion the revenue derived from the tolls became so productive, as to show conclusively that the bare pledge of them would be sufficient both to pay the interest and extinguish the debt.

The income for the year 1826, the first after the navigation was opened from the river to the lake, amounted to 800,000 dollars; for the year ending 1st of January, 1828, it will not fall short of a million. Hitherto, however the immense receipts have, in a great measure been absorbed by the canal itself, which can hardly be said to be finished even at the present moment. In anxiety to reap the advantages its navigation promised, the work was pressed hastily, and, perhaps, prematurely to its conclusion. Hence much was unfinished—much required alteration and repair. The expenditure, however, of the last two years has gone far towards making the canal complete, and in a very short space of time, it will be supported at an ex-

pense no greater than attends the repairs and care of other similar works. The debt will then rapidly diminish, and it may be confidently anticipated that within ten years the state of New York, will possess, free from incumbrance, a source of revenue more than four times as great as the largest amount of direct and indirect tax that has ever been levied.—*Brandt's Journal.*

RAIL ROADS—We learn from the Pittsfield Argus, that Col Perault, with a corps of United States Engineers are now surveying a route for a Rail-Road from that place to Hudson, N. Y. Mr Vailstone of the corps, has just finished a survey from Pittsfield through Richmond and West Stockbridge to the New York line. The route presents fewer difficulties than were anticipated; the greatest elevation being less than 70 feet to a mile, and the average elevation probably less than 30. The distance is much less than by the common road, it being not more than 9 miles from Pittsfield to the northern marble quarries in West Stockbridge. The route passes through many limestone and marble quarries, and two or three iron ore beds, that are now working.

Society of Civil Engineers.

A charter of incorporation has just received the Royal signature, constituting an institution of civil engineers, and naming Mr Telford its president. The objects of this institution, as recited in the charter, are, "The general advancement of mechanical science, and more particularly for promoting the acquisition of that species of knowledge which constitutes the profession of a civil engineer; being the art of directing the great source of power in nature for the use and convenience of man; of the means of production and of traffic in states, both for external and internal trade, as applied in the construction of roads, bridges, aqueducts, canals, river navigation, and docks, for internal intercourse and exchange; and in the construction of ports, harbors, moles, breakwaters, and light-houses; and in the art of navigation by artificial power, for the purposes of commerce; and in the construction and adoption of machinery; and in the drainage of cities and towns."—*Eng. Pap.*

Within the week ending on the 11th inst. seven hundred and forty-three barrels of flour; two hundred and sixty-three barrels of whisky, besides a large amount of other articles of produce, and one hundred and thirty passengers were entered at the canal office in this city.—*Cin. Paper.*

The Albany Daily Advertiser says, that one of the canal boats which arrived in that place on the 22d ultimo, from the city of New York, contained goods for the states of Pennsylvania, Ohio, Kentucky, Tennessee, Indiana, Illinois and the territory of Michigan, and that contracts have been made for carrying goods from the city of New York to Pittsburgh, by way of the canal, for \$2 25, and to Cincinnati for \$2 75 per hundred.—*Id.*

It was thought desirable to determine on the route for the canal, between Coshocton and Lake Erie, at as early a period as it could be satisfactorily and correctly done. This was necessary, both to enable the assessors of the counties situate on or near the line of canal, to affix a value to the lands in their respective counties, in reference to the enhanced value conferred on them by that improvement; and also to enable the engineers to progress with its final location, preparatory to putting it under contract.

To do justice between contending interests, and satisfy, as far as possible, the candid and judicious of both parties, it was desirable to obtain the opinion of an engineer of ability and experience, and who could have formed no previous opinion on the subject, in addition to those previously in our employ. Nathan S. Roberts Esq. a civil engineer combining these qualifications, under whose superintendence some of the most important and difficult parts of the grand canal of New York have been constructed, was accordingly obtained. Messrs Forrer and Price, whose intelligence and skill entitle them to full confidence, and whose knowledge of all the localities connected with the question was necessary in its investigation, were associated with Mr Roberts, and directed to make a full examination of the relative expense, safety and practicability of each of the proposed routes for the canal, between the diverging point, at Coshocton, and Lake Erie.

It had been suggested that changes in the location of some parts of the Killbuck line, would materially change the relative cost of the routes. A locating party was accordingly placed at the disposal of the engineers; who directed such further surveys to be made as were, in their opinion, necessary to determine the actual, as well as relative cost, of constructing a canal on each of the contending lines. They also caused careful examinations and surveys to be made, with a view of determining the practicability of supplying the Killbuck and Black river route with water, in the event of its adoption.

After having personally viewed and examined each of the lines in question, caused such surveys to be made as were necessary to give them a full and correct knowledge of the subject; and having made such changes in the former estimates on each of the routes, as a more careful inspection of the ground seemed to require, the engineers, to whom this duty was assigned, reported their opinions and estimates to the board, at a meeting which was held at Wooster on the fifth day of May last, for the purpose of making a final decision of the question.

From this report, a copy of which, marked B. is herewith transmitted, it will be seen that the estimated cost of the canal on the Tuscarawas and Cuyahoga route, is \$203,01 62 less than that of a canal on the route by the way of Killbuck and Black river; and \$334,839 3 less than that by the way of Killbuck Chippeway and Cuyahoga. This difference arises chiefly from the necessity which would exist of drawing water from the main Cuyahoga river, to supply a canal on either of the latter routes. A feeder for this purpose from the Cuyahoga, in the township of Stow, to Portage summit, must necessarily occupy ground presenting serious difficulties to its construction, and making its cost very serious. To pass this water into the valley of the Killbuck must involve the necessity of a deep and expensive cut through the Chippeway swamp, between the Chippeway and Killbuck creeks. The supply of water which can be commanded for a canal on the Killbuck and Black river routes, in dry seasons, was, by the engineers, deemed inadequate to the demand. To draw sufficient water from the Cuyahoga for the supply of a canal on the Killbuck and Chippeway route, would induce the great injury, if not total destruction, of some of the most valuable water privileges in the state; whilst the canal by the way of Tuscarawas and Cuyahoga valleys may be abundantly supplied with water, without any serious injury of this kind.

These considerations induced the board to adopt the Tuscarawas and Cuyahoga line for the canal. The decision was the result of the most careful and satisfactory examination of the subject which the time and means of the board would permit. Although those whose interest led them to hope a different result, could have wished for the existence of facts to warrant a decision more favorable to their interest; we believe the judicious and reflecting are satisfied with the correctness of the determination made by the board. The continued friendship of a large majority of the citizens who were interested in the Killbuck route, to the system of policy which has been commenced by the state, notwithstanding the decision so unfavorable to their local views, evinces a degree of liberality and generous regard for the prosperity and character of the state, highly creditable to themselves and worthy of general imitation.

The unavoidable absence of Judge Bates, prevented his participating in these examinations; his opinion, however, fully coincides with that of the other engineers.

At their meeting in Wooster, the board directed the acting commissioners to prepare for work, and put under contract, so much of the line of the Ohio canal, as extends from the first lock on the north, to the first on the south side of the Licking summit, with the exception of the deep cut; and the bank necessary to form the proposed reservoir on that summit—also so much of the line as extends from the Lake level, in the Cuyahoga river, near Cleveland, to Kendall, in the county of Stark. The board also directed to be prepared and put under contract, so much of the Miami canal as extends from Middletown, in the county of Butler, to the city of Cincinnati.

Two seasons, at least, are generally found necessary for the completion of heavy jobs on a canal, with economy and a due regard to the safety and perfection of the work. It was therefore deemed necessary to its vigorous and successful prosecution, to put under contract an amount sufficient to cover the appropriation made by law, for the current year, and a part of that for the ensuing year. Had contracts been made to an amount no greater than the sum appropriated for the year 1825, not one-third part of that sum could have been prudently expended on the canals previous to the time of negotiating the next loan authorized by law.

The commencement of the work at the Licking summit was made necessary by the act of the last session of the General Assembly; and it was also thought important to construct the reservoir on that summit at as early a period as possible, that its safety and its capacity for supplying the quantity of water calculated upon from that source, might be fully tested by experiment; and the work acquire the requisite degree of solidity and permanence, before its aid should become indispensable.

The board believe that the general interest of the state would be most promoted, and that it would best accord with the views and wishes of a majority of its citizens, to direct our main efforts on the Ohio canal to the completion of its northern section. One great object proposed by the construction of that canal, and probably the most important, is the opening of a direct and commodious channel of commerce, between the interior of our state and the great commercial emporium of America; where a safe, advantageous, and certain market can at all times be had for the surplus productions of our soil; and where such commodities as are desired in return can always be procured at the fairest rates, and in the greatest abundance. The obvious means of effecting this desirable object, are, the bringing of the New York market to our doors as soon as possible; in other words, extending the great commercial channel, already open from New York to the northern borders, into the heart of the state as rapidly as our means will admit. The completion of the grand Erie canal, and the direction which has been given,

even over our bad roads, to a large proportion of the surplus productions of the central counties of our state, during the last fall, demonstrate the correctness of the view we have taken.

The fertility, wealth and population of the country through which the Miami canal is to pass, the great amount of its surplus productions, which now find their way to market over roads, often extremely bad; the consequent necessity of a better method of transportation, as well as the spirit of the law under which the board act, urged them to the early commencement of the work on that line. No doubt is entertained of this canal being profitable to the state immediately after its completion. For, although the inhabitants of this country are compelled to send its exports to an uncertain and fluctuating market, it adds much to the evil to be under the necessity of seeking that market over bad roads.

If a commencement was to be made on the Miami canal, it became important to put under contract the whole line from Middletown to Cincinnati. A section of that canal, from Middletown to any point short of Cincinnati, would have afforded little inducement to navigation, and consequently remained useless and unproductive—or nearly so; and at any part of it extending from Cincinnati to a point short of Middletown, could not have been supplied with water, except in rainy seasons. By reference to the report of the board to the last General Assembly, it will be seen that the whole line between Cincinnati and a point near Middletown, must be supplied with water introduced from the Great Miami river, at the latter point.

Immediately after the decision of the board, in relation to the question between the Tuscarawas and Killbuck routes, a careful location of the line, from the Portage summit north towards Lake Erie, preparatory to putting it under contract, was commenced. This is necessarily a work requiring much time, and involving great responsibility. The surveys previously made were for the purpose of ascertaining the general practicability and probable expense of constructing a canal on the routes located. But in preparing a line for work it is necessary to keep constantly in view the cheapness of construction—the safety of the canal when made—its convenience and utility—the shortness of the line between any given points—a proper location and distribution of locks, so as to adapt the level, in the best possible manner, to the face of the country and character of soil, without making them of so small lift as to occasion unnecessary expense and delay on one hand, or of so great lift as to render them inconvenient and unsafe on the other. Reference must also be had to the convenience and certainty of obtaining, at all necessary points, the requisite supply of water. One additional day spent in surveying and levelling, in order to determine the best possible line, will sometimes save hundreds, and even thousands of dollars in the expense of constructing a canal. To ascertain where a canal *may be made*, often requires little time or skill; but to determine where it *can be best made*, requires much of both.

It will be seen, by referring to the report of last winter, that the Portage or summit lake, is about five and a half feet higher than the Tuscarawas river, at the point where it is proposed to cross that stream, and introduce its waters into the summit pound of the canal; and that it was proposed to reduce the surface of that lake to the level of the Tuscarawas, by sinking the canal north of the lake along, or near, its out-let; and also to cut through the swamp between the summit lake and the Tuscarawas, to the depth required, in order to bring the whole to the same level. Previous to the final adoption of this plan, examinations, at short distances, were made along this part of the line, in order to ascertain the character of the earth to be excavated, and whether the work would be impeded, or its cost materially enhanced, by the existence of rock or quick sand. These examinations disclosed

neither of these formidable obstructions; and no doubt is entertained as to the certainty of accomplishing the object proposed, at a reasonable expense. This plan was therefore adopted, and the summit level fixed accordingly.

About fourteen miles of line, extending northwardly from the summit lake, were prepared for contract on the 10th of June, and proposals were received on that day for its construction. As early as it could be satisfactorily ascertained at what time this part of the line would be in readiness for work, public notice was given of the time and place of receiving proposals for contracting. Exertions were also made to extend this information to the state of New York, where it was understood there were a number of experienced contractors, who wished to engage in our work. This was deemed important, as some apprehension was entertained that the citizens of this state would be unwilling to undertake, at fair prices, large jobs of work with which they were unacquainted, and the value of which they were consequently unable to determine. A considerable number of the most able and energetic contractors, who had been engaged in the construction of the New York and other canals, attended the sales; and it is probably owing, in a great measure, to this circumstance, that contracts were taken on terms so advantageous to the state. On the 9th of July, about seven miles of additional line, extending northwardly, was prepared for letting, and put under contract; and on the 29th day of August, the remainder of the line, between the Portage summit and its termination near the Lake, was contracted, except about one mile at the northern end of the line, as run in 1824. It was desirable to obtain the opinion of the principal engineer, who was then absent, as to some questions in relation to the proper place and plan of connecting the canal with the Cuyahoga river, on the Lake level near Cleveland. A more full examination and survey of that part of the line, than the time and previous engagements of the engineers had permitted them to make, was also necessary, in order to fix on the best plan. These surveys have lately been made under the direction of the principal engineer; and the line will soon be determined upon and the work commenced.

Mr John Bates, a young gentleman of considerable skill and experience in the science of engineering, has been obtained; and is now engaged in locating and preparing for work, the line between the Portage summit and Kendall. It is expected that this part of the line will be placed under contract in the early part of the next month.

The contractors for the line between the Portage summit to Lake Erie, are bound by the terms of their agreements, to complete the work as early as the first day of October, 1826, and most of them by the first day of September previous; and unless some great and unforeseen difficulty should prevent, it is expected that the whole line of canal between those points will be navigated, in the fall of 1826.

The whole extent of line now under contract, north of the Portage summit, is thirty-three miles fifty-five chains and eighty links, including forty locks, all of which are to be built of stone. Its aggregate cost, estimating the various kinds of work necessary for its completion, as far as the amount of each of the various kinds of work can be now determined, at the actual contract prices, will be \$366,939 67. This sum covers all the work specified in the contracts, so far as the same can be ascertained, and is believed to include all the important items which will be required, except the bridges, for which contracts have not yet been made. It may be necessary to build fifteen road bridges over the canal, on this part of the line. These will probably cost an average sum of \$180, each, including the expense of raising an embankment of earth at each end, to enable teams and carriages to ascend and descend to and from the elevation which these bridges require. The estimated expense of the bridges, added to the sum above stated, will produce an aggregate sum of \$369,639 67.

In the report of the commissioners, made to the last General Assembly, the cost of the canal from the Old Portage bridge to the Lake, was estimated at

\$446,033 21

To which should be added ten per cent. on that amount, to cover expenses of superintendence and unforeseen contingencies, agreeably to said report,

44,603 32

Making the total cost of that line, agreeably to that estimate,

490,636 53

To show the difference between the cost of that part of the line now under contract, north of the Portage summit, as originally estimated, and the cost of the same line estimated at the actual contract prices, there should be deducted from the above sum, the estimated cost of that part of the line north of the Old Portage bridge, which has not yet been put under contract, agreeably to the estimates of last winter,

48,509 81

Also ten per cent. on that amount

4,850 98

Total amount to be deducted for that part of the line not under contract,

53,360 79

Leaving the cost of the line now under contract, agreeably to the original estimates,

437,275 74

The cost of the same part of the line estimated at actual contract prices, including estimated cost of bridges as above stated, is

369,639 67

Leaving a balance of

\$67,639 07

The expenses of preparing for work, and superintending the line, during the progress of the work, and until its final completion, properly chargeable to this part of the line, will probably amount to seven or eight thousand dollars; and if a liberal allowance be made for the increase of some items of work, occasioned by some small changes of the line or plan of work, which may be found necessary during its progress, and also to cover contingencies still unforeseen; it will probably be safe to say, that this part of the Ohio canal will be completed for a sum forty thousand dollars less than the original estimates.

The abstract marked C. exhibits a detailed statement of the estimated quantity of each of the various kinds of work on each section under contract, north of the Portage summit, with the contract prices attached to each item, the sums to which the same will amount at the contract prices, the aggregate value of work on each section, the total amount of work on all the sections under contract, the aggregate amount of each item of work, its average cost, the names of the contractors and dates of their agreements.

Previous to placing the line under contract, examinations were made, by digging or boring, as frequently as once in every six chains, along the line first contracted, and once in every three chains, on the line subsequently let.

These examinations were calculated to disclose the true character of the earth to be excavated, and to prevent disappointment to contractors as to the value of the work. The calculations from which the results herewith submitted have been drawn, so far as relates to the first fourteen miles first contracted, including 27 locks, are made from levels carefully taken, at the time of setting stakes for excavation and embankment; and many of them

from the measurement of work actually performed, and cannot vary materially from the truth. On the remainder of the line, between the Portage summit and the Lake, they are from the levels and surveys made in laying out the work for contract, except in some instances, where they are made from the measurement of work done; and a small difference between the estimated and real amount of work to be done, probably exists.

The work was commenced on the line north of the Portage summit early in July, and has, since that time, been prosecuted with much vigor and success. One section, of twenty-four chains in length, which was put under contract in July, has been completely finished. Another of thirty chains has been finished, except the building of a small culvert; and the excavation and embankment on several others has progressed, as far as can be done previous to the finishing of the locks with which they are connected. The excavation and embankment have been commenced, and are progressing with great rapidity, on much the greater number of sections under contract; and near twenty-two and an half miles of the line had been grubbed and cleared before the twentieth of November last. Many of the lock-pits had been dug; the foundations of six locks laid; the walls of three commenced, one of which lock No. 3, on the job of Beecher and Watson, is now completed, except the gates. Upwards of forty-six thousand feet of stone, suitable for the face stone of locks, in addition to those already laid, have been taken from the quarry; more than 18,000 feet of which have been cut fit for laying, and 22,000 feet delivered at the sites of the locks. More than one hundred and sixty-four thousand yards of earth, and seven hundred of rock, have been excavated; forty-five thousand yards of embankment formed. Sixty-five thousand feet of timber prepared for laying, or already laid, into moles, for protecting the banks of the canal, and prepared for the foundations of locks and culverts, besides the timber already placed in the foundations of the locks; between six and seven thousand perches of stone, besides those already laid into the walls of locks, have been quarried, upwards of four thousand perches of which have been delivered ready for use.

The abstract marked D. will exhibit, at one view, the state of the work on each section north of the Portage summit, the amount of each of the various kinds of work done, under each contract, and generally on each section, together with the amount of money paid to each contractor. From this abstract it will appear, that the total amount of payments made to contractors on the line north of the Portage summit, up to the 23d day of November last, is \$63,279. 00.

The work on part of the line under contract, along the valley of the Cuyahoga, in the townships of Portage and Northampton, was considerably retarded in September and the early part of October, by sickness. Most of the laborers employed were unaccustomed to the climate, and neglected to take the necessary precautions for preserving health. Where proper means were used, to avoid the diseases incident to the season and climate, the laborers were generally healthy, even on those parts of the line most exposed to sickness. Since the early frosts, and the commencement of the cold weather, the workmen have been healthy, and the work has continued to progress with increasing rapidity. The number of laborers employed on this part of the canal, on the 20th of November last, could not be exactly ascertained; it was, however, between 1,500 and 2,000.

The work has now progressed so far, that its fair value is well ascertained. Work of almost every description, required in the construction of a canal, has been performed, and some of the jobs taken at the lowest rates have been completed. Most of the contracts have been taken at prices, which, with judicious management, will yield a handsome profit to the contractors; some of the sections have, however, been taken at prices which will require strict economy, and good management, to nett even a small profit.

Soon after the engineers had completed the discharge of the preliminary duties assigned them, and when the plan of location at and north of the Portage summit, which involved several important questions, had been settled, the preparation of the line on Licking summit, for putting it under contract, was commenced. At as early a period as a day could be fixed, when the line could be got in readiness, notice was given in the public prints, that propositions for its construction would be received on the 17th day of June. The result afforded to the commissioners another gratifying evidence of the disposition of experienced and able contractors to engage in the work at prices below those at which it was estimated in their report to the last General Assembly. The competition was such as to enable them to place under contract, in the hands of good men, ten miles and thirty-six chains, the entire summit level, except the deep cut, and the embankment for the reservoir, two miles and twenty-three chains in length, upon terms, in all respects favorable to the state. Preparations were immediately made by the contractors, for a speedy commencement and vigorous prosecution of the work.

About to commence, in behalf of the people of the state, the construction of the second great national work of internal improvement in the United States; and, recollecting the debt of gratitude which is due, for his able and effective services in the cause, to that distinguished individual, the acknowledged head of the policy which is so happily extending itself throughout our common country; and, remembering, also, the deep interest which he has in all cases evinced, in the success of the efforts of Ohio, the commissioners felt it to be a mark of respect due, and that it would accord with the feelings of their fellow citizens, to invite Governor CLINTON, of the state of New York, to be present at the important and interesting ceremony of commencing the work. They were highly gratified at his acceptance of the invitation, and with the prompt manner in which he encountered the difficulties of complying with their wishes.

On the fourth day of July, the board had the satisfaction of witnessing the commencement of the work, in the presence of our patriotic Chief Magistrate, who had also been invited to be present on the occasion, and of Governor CLINTON, together with several citizens of New York, distinguished advocates of the policy, and a vast concourse of their fellow citizens. But a few weeks were suffered to elapse, after the first commencement, before the whole line presented an active scene of operations, which has been continued with increased force until the present time. The work on the whole line under contract, is now in a very considerable state of forwardness, with the exception of one half mile, on which the work has not been commenced. With this exception, the whole line is grubbed and cleared, and the excavation and embankment on each section is in a very considerable state of progress. More than five hundred laborers were employed upon this line during the past month.

Abstract marked E. exhibits the names of the contractors—the extent of each contract—the contract price of each item of work—the average price of each kind of work—the total estimated amount of each contract, and of the whole line at contract prices—the amount of work performed under each contract, and the amount of money paid upon each.

From the scarcity of stone on this part of the line of a quality suitable for the construction of culverts, and from the limited time allowed for its preparation for contract, it was found to be impracticable to determine, at the time of letting the contracts, where stone suitable for this item of the work could be procured, and consequently, it was impracticable to fix by contract, understandingly the price to be paid for the culverts. This item was therefore, together with a small aqueduct across the South fork of Licking, con-

tracted to be paid for at the appraisal of the principal engineer. In the abstract referred to, it is placed fifty per cent. higher than the original estimate, which is probably necessary to cover its cost, owing to the greater distance than was originally supposed, which the stone has to be transported. But, notwithstanding this extra charge upon the culverts, the estimated cost of this line, at the contract prices, falls considerably short of the cost of the same line, as estimated in the report of the last year. Including the reservoir and ten per cent. to cover contingencies, as stated in the original estimates, this line was estimated to cost \$102,691.87. The estimated cost of the same, at contract prices including the extra allowance for the culverts, and other contingencies, is \$85,956.14; leaving a balance of \$16,735.73, which the line is under contract at less than its estimated cost.

Under these contracts work has been performed, up to the 26th November, to the amount of \$27,787.98; and payments have been made to the contractors, on account of work performed, to the amount of \$23,583.00. Since the reservoir embankment has been placed under contract, it has been deemed advisable, for its greater security and safety, to place a wall of timber in the centre of the bank. This is an additional item of cost which was not included in the original estimate, and is not included in the foregoing statement, as its amount is not certain; it is to be paid for at the estimate of the engineer, when completed. The contracts for the construction of this line stipulate for its completion by the first day of October next.

Towards the latter part of June, the commissioners were enabled to commence the preparation of a part of the Miami canal for contract; and on the twentieth of July, in pursuance of public notice previously given, contracts were made for the construction of twenty miles of that canal, including six locks, extending from a point on the Miami river near Middletown, to the head of Mill creek. These contracts were, as in the former cases, effected at prices, in all cases as low, and in most, lower than the original estimates. On the day following, the work was commenced on this canal, in the presence of the distinguished Chief Magistrates of Ohio and New York, and an immense concourse of deeply interested citizens: Since which, it has progressed with spirit and effect, and is now in a flattering state of progression.

As early as the twenty-seventh of September, twenty two miles in addition, including six locks, extending to a point near Cincinnati, were prepared and placed under contract upon terms still more favorable to the state; making in all, forty two miles of this canal now under contract. Upon the whole of this line, with only one or two exceptions, the contractors have already commenced the work on their jobs, and are prosecuting it in a manner highly satisfactory. Thirty miles and more are now grubbed and cleared; the excavation already performed exceeds 200,000 cubic yards; three large culverts are built, and the other items of the work have progressed in the same proportion. The most serious difficulty which has been experienced, or is anticipated, in the prosecution of the work on this line, arises from the scarcity of stone of a suitable character for the construction of the locks, and from the difficulty of procuring water lime. It was, in the first instance, thought most advisable to construct the locks of timber; and contracts for the first eight locks were made accordingly. It was, however, soon ascertained, that, to obtain timber in sufficient quantities, would be attended with difficulties—be more costly than was anticipated, and, in most cases, would inflict a serious, and measurably irretrievable injury upon the adjacent country. It was determined, therefore, to suspend the construction with timber, of most of the locks, and to make further efforts for the discovery of stone, which have so far been successful, as to induce a belief that stone will be obtained within a reasonable distance for their construction. The cost of obtaining the stone will, however, be such as to forbid the hope of constructing

the locks for a sum below the original estimates of their cost. If the saving in the cost of the locks could have been in the same proportion with that on the other items of the work under contract, this line would be constructed for a sum very considerably less than that at which it was estimated. From the best estimate which can be made upon the other items of the work, at contract prices, making a liberal allowance for all contingencies which will probably occur, and placing the cost of the locks at \$4.00 per perch, the line under contract will be constructed for the sum of \$358,984.14. This is less than the sum at which it was estimated, in the last report of the board, by \$25,000; and makes an average cost, per mile, including twelve locks, of \$8,547.24.

Abstract marked F. will shew the name of each contractor—the extent of his contract—the contract price of each item of work—the average price of each kind of work—the total estimated amount of each contract, and of the whole line under contract, at contract prices. The value of the work performed on this line, up to the 21st November, is estimated at \$34,758.76, and the payments made on account of work done amount to \$31,994.00. The number of laborers engaged upon this line, in the month of November, amounted to nearly nine hundred. The contracts for the first thirty miles of this line require its completion by the first day of October next, and for the last ten miles by the 5th of May, 1827.

In the last report of the board to the Legislature, two points of termination at the Ohio river, near Cincinnati, were named. The one, by preserving with the line a high level from a point about ten miles up the valley of Mill creek, and passing the northern part of the upper plane upon which that city stands, terminating at the mouth of Deer creek, above the city; the other, by locking down the valley of Mill creek, as it descends, and passing the western margin of the city, upon a low level, to unite with the river at a point immediately below it. Estimates of the cost of each of these lines were made, which shewed a difference in favor of the line upon the low level, of about \$45,000; and the cost of the Miami canal, as stated in the report, was estimated upon this line. Upon a full investigation of the question of the proper point to terminate the canal, which was made in August last, it was deemed advisable, with reference to all the interests connected with the canal, notwithstanding the estimated difference of cost, to adopt the line upon the high level and terminate the canal at the mouth of Deer creek.

The superior value of the hydraulic privileges afforded by the high level; the favorable position which the mouth of Deer creek affords, when compared with the other point of termination, for a safe harbor for steam and canal boats, both in low and high water; the great facility it affords, over any other, for the construction of dry and wet docks, which the increasing commerce of the Ohio river, and the interests of the public will soon imperiously require; and the prominent and mutual advantage, both to the surrounding country and the city, which the level, uninterrupted by locks for a distance of ten miles back into the country, will afford; all conspired to produce the conviction upon the minds of the commissioners, that the adoption of that line was required by the general interests connected with the work. It will be recollected, that in the last report of the board, calculations were made upon the extent and value of the surplus water, which it was believed could be drawn from the Miami river to this point. With a view to this object, the capacity of the upper end of this section of the canal is enlarged, for the purpose of receiving and passing forward a greater supply of water. The first ten miles from the river are constructing with an increase of one foot in depth, and three feet and an half in the width of the top water line; and the next fifteen miles, with an increase of half a foot in depth, and one foot and three fourths in the width of the top water line. The increase of the

capacity of the canal must proportionally enhance its cost, and is another reason for the apparent disparity between the savings on this line, at contract prices, compared with original estimates, and the other lines under contract. It is, however, believed that the cost of this increase of the capacity of a part of the line will be more than reimbursed to the state in the value of the surplus water which is anticipated from it. Propositions have already been made by responsible individuals, to contract for the use of the whole amount of surplus water which can be delivered at Cincinnati, at the price placed upon it in the last report of the board.

It will be recollected, that the first location down the valley of the Scioto, was made on the east side of the river, and that doubts were entertained, as to the proper side for its final location. Early in the season, a line was directed to be run, crossing the river above the mouth of Deer creek, and continuing on the west side, through Chillicothe, to a point opposite Piketon, with a view to a comparative estimate of the cost and advantages of the two lines. The result of the comparison proved to be in favor of the west side. In addition to this, it was desirable, as a measure of public justice and policy, that the canal should pass through Chillicothe. It was, therefore, unanimously decided, that the canal should cross the Scioto river at some point above that place. It is hoped, that by crossing the Scioto, by means of a dam, a sufficient quantity of water may be drawn from it, with the aid of a feeder which may be introduced from Paint-creek, to supply the Canal to the Ohio river. Should this prove to be the case, it may recross the river upon a high level, near Piketon, by the means of an aqueduct, and thus enable it to command the high plain below.

The pressure of duties upon the superintending part of the Board and the Engineer department, has been such as not to allow a full investigation of all the questions which the final location of the line through the Scioto valley presents. As soon as additional assistance in the Engineer department, for that purpose, can be obtained, it is the intention of the Board to make the final location of the line through this valley to the Ohio river.

Written contracts have, in all cases been made, signed by the contractor, and by the acting commissioner, on the part of the state. One copy of these contracts is given to the contractor, one retained by the acting Commissioner, and a third reserved as a public document. The contract contains a description of the various kinds of work to be done, and a stipulated price for each item; except, in some few peculiar instances, where the value of the item of work cannot be ascertained at the time of making the agreement, and is left to the determination of the Engineer having charge of the work. The form of a contract, marked G. embracing almost every variety of work, is herewith transmitted. To this, we beg leave to refer for a more minute description of the plan and manner of executing the work.

The contracts have been entered into, on the part of the contractor, with the express understanding, that no greater prices for work, of any description, would be allowed or paid, *in any case whatever*, than those specified in the articles of agreement. Much evil and inconvenience is understood to have resulted, from the adoption of a different practice, in New York, during the progress of the work on the canals of that state. To remunerate a contractor, who has managed his work with economy and fidelity, for an actual loss, sustained in consequence of an error in judgment as to the ease or difficulty of performing a particular job, would, in itself considered, seem just and proper; and yet, the consequences growing out of such a practice are most pernicious. A custom of this kind, once commenced, soon grows into a law: Contractors take jobs with the expectation that their losses, if any, will be remunerated; and to withhold this remuneration from the honest, becomes an act of injustice. When the rule becomes generally known and es-

tablished, contractors are no longer interested in the economical and vigorous prosecution of their work, difficulties are magnified, and various arts are practised to induce a belief that the cost of the work is much greater than it really is. Even the laborer becomes infected with the general malady, and grows idle or remiss in the performance of his work, when he finds that his employer is not injured by his negligence or idleness. Unfaithful and dishonest contractors will take jobs at prices for which they know the work can never be done, with the view of defrauding the public; whilst men of perseverance and integrity, who scorn to practice these acts of deception, are underbid and prevented from obtaining contracts at fair prices.

These considerations have induced the commissioners to adopt the rule of paying no more than the contract prices, in any case whatever; with a fixed determination to adhere strictly to its observance. This determination has been made known to all persons applying for contracts, and has in no instance been departed from.

The experience of the past season, induces a belief that the work on the canals may advantageously progress with considerably greater rapidity than was contemplated by the last General Assembly. It is believed that labor may be obtained to a much greater extent than will be required to prosecute the work at the rate proposed by the existing law; and that too, without materially enhancing the price of wages. Provisions are so abundant, that no apprehension is entertained of their price being considerably raised by any consumption which may occur on the line of canal. That the work should progress as rapidly as possible under the superintendence of able and experienced engineers, and without materially enhancing its costs, is a proposition too clear to require much argument in its support. The earlier the canal can be completed, the sooner will the people be blessed with the facilities of commerce which it will present; and the sooner will it relieve the state from the payment of interest on the money expended in its construction.

The greatest objection which presents itself to the adoption of this course, is the doubt which exists as to the ability of the board to procure the requisite number of skilful and experienced engineers, to lay out the work, and to superintend it during its progress. Much time is necessarily required for the judicious location of a line of canal; and few, who are not personally acquainted with the actual construction of a canal and the various works connected with it, will duly appreciate the time, care and labor required in their superintendence. Notwithstanding this difficulty, the board confidently believe that an additional number of experienced engineers may be obtained; and that the work may be finished in a period considerably shorter than that contemplated by the existing law.

It is highly probable that the commissioners of the canal fund will be enabled to negotiate a loan for the whole sum required for the completion of the canals, authorized by law to be made, on terms more advantageous to the state, than they would be able to obtain on smaller loans from time to time, as now empowered by law. Large capitalists are frequently averse to a division of their funds, amongst various stocks, in sums comparatively small; and it may also be an object to acquire a controul of the whole, or at least the greater part, of any stock in which they are interested. Should the commissioners of the fund be authorized to negotiate a loan for the whole sum required, at one time, it is possible it may be done, payable in instalments from time to time, as the money will be required for use. Or should the whole loan be made payable at once, it is probable that so much of the loan as will not be required for immediate use, may be safely invested, on the pledge of government stock, or other sufficient security, at a rate of interest which will relieve the state from any additional burden, in consequence of the negotiation of the whole loan. The surplus not required for immediate use,

may, undoubtedly, be invested in government stocks, which will draw the interest payable on the stock, and at any time command the money, as the progress of the work may require. No evil, it is believed, can result from investing the commissioners of the canal fund with discretionary powers to act in reference to this subject, as they may deem the best interests of the state require, after obtaining the requisite information. The board therefore respectfully recommend such a modification of the existing law as will effect the object proposed, and enable the board to prosecute the work with greater rapidity than the provisions of the existing law will permit us to do.

Applications have, in most instances, been made to the owners of the lands through which the canal passes, for cessions of so much thereof, as will be necessarily occupied by the canal and the works connected therewith. Cessions from most of the proprietors have been obtained for such parts of the canals as are now under contract. It is believed that there are few instances in which the owners of lands, through which the canals will pass, will set up claims for damages; and still fewer in which they will be allowed by judicious men, if claimed.

Liberal donations, in land and money, to the canal fund, have been obtained from several individuals. To these donations conditions have usually been attached in favor of particular routes; and the bonds have been made payable, on the completion of the canal to certain points therein designated. A schedule marked H. exhibits the names of the donors, the certain or estimated value of the donations, as well as a particular description of the donation made. The total amount, as will be seen by reference to that document, is twenty-five thousand and six dollars. These donations have been obtained on that part of the Ohio canal north of New Philadelphia, and at Chillicothe. Further donations to a considerable amount are also anticipated.*

It is just and reasonable that those individuals, whose property is so situated as to be materially enhanced in value by the making of the canal, should contribute, at least a small portion, of that increased value, in aid of the work from which this benefit is derived. Good policy, in this case dictates the course which is demanded by justice to those who receive less advantage from the work, but who aid in its construction. Every thing which tends to apportion the burdens to the benefits which will be received, has the effect, in a degree, of allaying sectional jealousies, and uniting the sentiments of the people, in every part of the state, in favor of the great work in which we are engaged. Upon this union of sentiment, at least to a certain extent, depends the vigorous prosecution of the work and its ultimate success.

The donations obtained ought to be placed to the account of interest, payable on loans during the progress of the work. The donors own no part of the stock, and will receive no part of the income of the canals when completed. If the nett profits of the canals will pay the interest on their cost immediately or soon after their completion, and will ultimately redeem the principal, of which we entertain no doubt; it is clear, that the interest accruing on loans previous to that time, is all the state will ever be required to pay. The donations obtained may be applied directly to this object; and although this amount is small, compared with the whole cost of the canals, it is considerable when compared with the sum which the state will be required to raise by taxation, to meet the interest payable on loans.

No authority was vested by the law of the last session, either in this board or in the commissioners of the canal fund, to make sales or conveyances of land granted in aid of the fund. It seems necessary that this authority should

* Donations have been subsequently received from the village of Cleveland, to the amount of upwards of five thousand dollars.

be somewhere vested. Some of the donations consist of a certain part of new towns or villages, laid out on the canal. The growth and prosperity of these places, and the consequent value of the property, depend upon the sale of a due portion of the lots, so as to induce a rapid settlement. To effect this object, the title has, thus far, been suffered to remain in the original proprietors; who are bound to account for a portion of the amount of sales. The death or insolvency of any of the proprietors, whilst the title remains in them, might seriously embarrass future sales, or might subject the state to a total loss of its interest in those villages. To obviate these difficulties, the board respectfully recommend, that the commissioners of the fund, or some other agent of the state, be authorized to sell and convey all lands granted to the state in aid of the canal fund.

In order to secure to the state the full and uncontrolled profit and disposal of the water power which may be created by the making of the canals, it may be necessary to purchase from individuals, so much land as will be required for its free and convenient use. After the final location and construction of the canal, the owner of the land, on which alone the surplus water can be used for hydraulic purposes, will have it in his power either to obtain the use of the water at his own price, or to lock it up from use, by demanding for the land a price equal to the value, both of the land and the water power. Previous to the final location of the canal and locks, which will fix the proper point for using the surplus water, it may be in the power of the commissioners to obtain the requisite quantity of land at a fair price. To meet this case, a statutory provision is thought advisable, and is respectfully recommended to the General Assembly. To vest the commissioners with authority to sell, rent or otherwise dispose of the surplus water of the canals, for hydraulic works, may also be proper and expedient.

In laying out and making the canals, it often becomes necessary to occupy ground already occupied by roads; and a frequent crossing and recrossing of the same road, which may happen to run nearly parallel with the canal, is, in some instances, unavoidable. In such cases it would be much more convenient and less expensive, as far as possible, to throw the road entirely on the side of the canal. Numerous bridges over canals greatly incommode the navigation, and sometimes occasion serious accidents. To build these bridges and keep them in repair, also creates considerable expense, either for the state or to the county or township, in which they are situate. The length of time required, under existing laws, in relation to the alteration of roads, in many instances, renders it impossible to effect the alteration as soon as necessity requires. The board respectfully recommend some legal provision, by which such small alterations in roads as do not materially affect the public interest, but which become indispensable in making the canals, can be made with less expense and delay.

Some legal provisions, to prevent injury to the banks of the canals, reservoirs, feeders, locks, dams, and other works connected with the canals, will become necessary previous to the next session of the Legislature.

Nothing has occurred, during the past season, calculated to create a distrust as to the practicability of making a canal on the routes adopted; nor of inducing a belief that the difficulties or cost of constructing canals on those routes, will be greater than they were estimated in the report to the last General Assembly. On the contrary, the experience which has been had in the actual construction of almost every kind of work required to complete the canals, affords satisfactory evidence that they can be made for a sum within those estimates. Some parts of the line will, undoubtedly, prove more difficult and expensive than was anticipated; and others will, unquestionably, prove less difficult and less expensive. Although the last season has been unusually dry, and streams uncommonly low, full confidence is still enter-

tained that every part of both canals, can be at all times abundantly supplied with water. The former calculations of the board on that subject, were predicated on frequent and careful examinations, of the sources of supply relied upon; they were intended to be perfectly safe, and no doubt is now entertained of their having been so.

It is still believed, that the estimates submitted to the last General Assembly, in relation to the revenue, which will be derived from the canals, in the different stages of their progress, and on their final completion, will be fully realized. The immense and rapidly increasing amount of the surplus productions of the state, which will seek a market through the canals when completed—the direction which is now given, to such of those productions as will bear transportation, to the navigable waters which form our northern and southern boundaries, fully justifies this belief. The examples afforded us in the productiveness of the Grand Canal of New York, now happily completed, gives us strong assurances that our own, when finished, will be profitable to the state, as well as beneficial to its growing population.

The board do not anticipate, that the same amount of transportation will be done on the Ohio canal, immediately after its completion, that is now done on the Erie canal of New York; nor will this be necessary in order to derive from tolls the same per centum on its cost. The expense of constructing the Ohio canal will not be, on an average of its whole length, more than half as much per mile, as that of the Erie canal of New York. This difference arises chiefly from the great difficulties which were encountered on some parts of that canal, and from which, ours is happily exempt. We have no mountain ridges of solid rock, to cut through, nor precipitous ledges, like those of the Mohawk, to encounter. The abundance of materials which are, almost every where, found in the vicinity of our line, and the wonderful ease with which they are procured and fitted for use, also contribute greatly to this difference in cost. Such are these facilities, that forty locks, now under contract, on the Ohio canal, almost all of them to experienced and able contractors, who are at this moment prosecuting their jobs with the greatest energy, are taken at an average price of a fraction less than \$517.12½ per foot lift; whilst those on the New York canal are estimated to have cost, on an average nearly double that price.

Our canals pass through countries at least as fertile, and capable of yielding as great a quantity of productions, for market, as those of New York; and, although our situation is more distant from the place of market, the same necessity exists of reaching that market, with all such articles as will bear transportation. It is true, the Erie canal terminates in tide water, and leads to the city of New York; ours, also, is directed towards the same point. That canal connects the Ocean with the great Lakes; ours will connect the same great Lakes with the extensive navigable waters of the Ohio and Mississippi, and through them with the Gulf of Mexico and the West Indies. The New York canal connects distant countries, situated nearly in the same latitudes, and yielding the same productions; the Ohio canal will connect distant countries, lying in different latitudes, each abounding in productions not common to the other, making an interchange through this channel mutually beneficial to both.

During the prosecution of this noble work, it cannot be necessary to resort to unreasonable or oppressive taxes, in order to carry it on. The law of the last session, "Establishing an equitable mode of levying the taxes of this state," will have the effect to equalize the taxes amongst the different counties, and the people in each county, in a much greater degree than any system heretofore adopted in this state. Although perfection, in this respect, will not be attained, still there will be a great approximation to that desirable end. The present law will also, in a great measure, produce the effect

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY, BY JOHN KILBOURN, AT \$3 A YEAR, IN ADVANCE.

VOL. I. COLUMBUS, OHIO, SATURDAY, SEPT. 13, 1828. NO. 13

Readers will notice that the Canal Documents are continued on the third page of every number, from the last page of the preceding number.

It is with much satisfaction, the publisher states, that since the publication of the last number, an unexpected source of supply of printing paper has presented itself; and that a quantity has been procured, sufficient to continue this work for half a year at least. The subscriptions are also increasing; and the general prospects of success, in the publication, brightening.

This number completes one quarter of a year of this paper. Such subscribers as have not yet paid, are informed that all dues to the establishment are wanted.

Although this work is designed, especially, for embodying, in a compact form, notices and public documents concerning Internal Improvements, yet, it may not perhaps, be amiss, occasionally, to register curious notices of events and topics, not coming completely under this specific head. Accordingly we have here inserted a curious table of Hygienical statistics; taken from an English paper, through the medium of the Western Teller, a well conducted paper in Cincinnati.

It was drawn up by Dr. Granville, a physician of very extensive practice. He submitted the registered cases of 876 women; and the following table, derived from their answers as to the age at which they respectively married, is the first ever constructed to exhibit to females their chances of marriage at various ages. Of the 876 females, there were married,

<i>Years of age,</i>	<i>Years of age,</i>	<i>Years of age,</i>
At 13	At 22	At 31
3	85	7
14	23	32
11	59	5
15	24	33
16	53	7
43	25	34
17	36	5
45	26	35
18	24	2
76	27	36
19	23	0
115	22	37
20	2	38
118	17	0
21	38	1
86	39	
	9	
	39	

From this table, it appears that more females are married, at 19 and 20 years of age than at any other period of life: and that the numbers, who are married in any given year of their lives, becomes less and less each year as they recede from the age above mentioned.

It is to be borne in mind, that the females, whose relative ages, at the time of their marriage, as above exhibited, were all of the lower classes. Among an equal number from

the middling or the higher classes, we should not probably find so many as 195, or more than one fifth married, under the age of 19; or so few as one sixteenth part after 23; or only one thirtieth part after 30.

From this curious statistical table, our fair readers may form a pretty accurate judgment of the chances, which they have of entering into the holy state of matrimony, and of enjoying the sweets, (we say nothing of the bit-ter,) of wedded love."

CANALS.

The following brief sketch, from the YEOMAN'S GAZETTE, of the CANALS and RAIL ROADS, finished, commenced, or intended, in the UNITED STATES, appears to have been carefully made, and is an article of some value:

1. *Middlesex Canal.*—This has been finished and in operation for several years; its length is 29 1-2 miles; it has 136 feet of lockage. It runs from Boston harbour to Chelmsford, in this county.

2. *Blackstone Canal.*—This undertaking is not yet finished, but is in rapid progress. Its length is 45 miles, from Worcester, Mass. to Providence, R. I.

3. *Farmington Canal.*—This is unfinished. Length—miles, from Northampton, Mass. to New Haven, Conn.

4. *Hudson and Erie Canal.*—This is in operation. Length 393 miles, from Albany to Buffalo, N. Y.

5. *Champlain Canal.*—Completed; length 63 miles, from Albany to Whitehall.

6. *Oswego Canal.*—Completed: length 38 miles, from Salina to Oswego, connecting the Hudson and Erie Canal with Lake Ontario.

7. *Seneca Canal.*—Completed; its length 20 miles, connecting the Seneca and Cayuga Lakes with Hudson and Erie Canal.

8. *Delaware and Hudson Canal.*—Length 65 miles, from Delaware in Orange county, to Hudson near Kingston.

9. *Morris Canal.*—This is in progress, its length 86 miles, from Easton to Newark, N. J.

10. *Chesapeake and Delaware Canal.*—Completed; length 14 miles, from Delaware river to Chesapeake bay.

11. *Port Deposit Canal.*—Completed; length 10 miles, from Port Deposit on the Susquehanna to the Maryland line.

12. *Chesapeake and Ohio Canal.*—This was begun on 4th of July last, when ground was broken by the President of the United States. Length 360 miles, from Georgetown, D. C. to near Pittsburg, Penn.

13. *Ohio State Canal.*—Unfinished; length 306 miles, from Cleveland on Lake Erie to the Ohio at the mouth of the Scioto.

14. *Miami Canal*.—Unfinished; length 265 miles, from Cincinnati to the Maumee, near the head of Lake Erie.

15. *Lehigh Canal*.—Unfinished; length 46 miles, from Stoddardsville, on the Lehigh, to Easton, on the Delaware.

16. *Little Schuylkill Canal*.—Its length 25 miles, from the mouth of Little Schuylkill river to the coal mines.

17. *Conestoga Canal*.—Length 18 miles, from Lancaster to the mouth of Conestoga creek.

18. *Schuylkill Canal*.—Finished; length 108 miles, from Philadelphia to Mont Carbon.

19. *Union Canal*.—Finished; length 79 miles, from Reading to Middletown.

20. *Pennsylvania Canal*.—in progress; it having been commenced at both extremities; length 296 miles, from Middletown to Pittsburgh.

☞ The three last mentioned canals form a line from Philadelphia to the Ohio, at Pittsburgh, and may be considered parts of the same great enterprise.

21. *Ohio and Erie Canal*.—Its length 113 miles, from Pittsburgh to Erie, on Lake Erie.

22. *Delaware Canal*.—This will run from Philadelphia to meet the Delaware and Hudson canal. It has already been begun.

23. *James and Kenhawa Canal*.—This will run from Richmond to Kenhawa.

24. *Dismal Swamp Canal*.—Finished; length 23 miles, from near the mouth of James river to Albemarle Sound.

25. *Louisville Canal*.—In progress; length 3 miles, to pass the rapids near Louisville, Kentucky.

26. *Santee Canal*.—In progress; length 150 miles, from Columbia by the Broad and Saluda rivers to Cambridge, and from the Santee to Charleston.

27. *Savannah and Altamaha Canal*.—Length 66 miles, from Savannah to Altamaha.

The preceding statement gives the names of ten canals, which have been completed by our enterprising countrymen. These ten traverse a space of 747 miles. Eleven other canals have been commenced, some of which will probably be finished before the year closes. The whole distance, which the several canals now in progress towards completion are expected to extend, is 1644 miles. The remaining seven, whose names and intended location are given in the above list, are calculated to reach 430 miles. The total extent which all these will reach, is 2321 miles nearly equal to the distance from this place to London.

The subject of Rail Roads has attracted much less attention than Canals. But even Rail Roads have not been overlooked.

The *Quincy Rail Road* has been a considerable time in operation, and far exceeds expectation. Its situation is about 8 miles from Boston; length 3 miles. The *Maunch Chunk Rail Road* has also been finished, its length is 12 miles. These are the only ones yet finished. The *Schuylkill West Branch Rail Road* has been begun; its length 8 miles. In addition to these projects have been on foot, and some advances made toward making Rail Roads from Boston to Providence, 42 miles; from Boston to the Hudson, near Albany, 187 miles;

from Albany to Schenectady, 16 miles. There are also the *Camden and Amboy*; the *Danville and Pottsville*; the *Columbia and Philadelphia*; and the *Baltimore and Ohio Rail Roads*.

From the Rochester (N. Y.) Telegraph.

CANAL BOAT SONG.

AIR—*Meeting of the Waters.*

Full free o'er the water our bonny boat glides,
Nor wait we for fair winds, nor stay we for tides;

Through fair fields and meadows—thro' country and town,

All gaily and gladly, our course we hold on.

From the lake to the river—from river to lake,
Full freighted or light, we still leave a wake;
From the west bearing all that a rich country yields,

To the labor which makes the morn glad in the fields.

Returning again from the river's bright breast,
Bear the products of climes far off, to the west—

And add to the backwoodsman's comfort and ease

All that commerce can give by its spoils of the seas.

Our "Ditch" is the pride and the strength of the state,

Its wealth gives it power, and its glory gives weight—

While the greenwoods shall echo our bugles' shrill swell,

We'll remember New York, and its Erie canal.

Then free o'er the waters our bonny boat glide,
Nor wait thou for fair wind, nor stay thou for tide,

Thro' fair fields and meadows—thro' country and town,

All gaily and gladly our course we hold on.

A—

PERIODICAL LITERATURE.

THE editor and publisher of this paper is duly authorized to receive subscriptions, and to receipt for all moneys therefor, for the following works, published quarterly, each, at \$5 a year in advance, namely:

North American Review,
American Quarterly Review,
American Journal of the Medical Sciences.

—Also—

The following monthly publications, at \$6 a year in advance, namely:

Museum of Foreign Literature,
Journal of Foreign Medicine,
Religious Magazine.

—Likewise—

Franklin Journal and Mechanics Magazine;
at \$5 a year, in advance.

All the abovementioned works are published in Philadelphia; excepting the *North American Review*, which is published in Boston.

—Likewise—

The Western Monthly Review,
Published in Cincinnati, at \$3 a year.

contemplated by its adoption, of throwing the burthen of taxation heaviest on those parts of the state which will derive the greatest benefit from the canals.

At no time during the progress of the work, will the people of the state be called upon to pay in taxes, a sum as large as was paid by them at a period when their numbers did not much exceed half the present amount. The expenditure of money in making the canals; the spring which it will give to enterprize and exertion; the increase of population and wealth, which will be the certain result of this great undertaking. will give to the state an increased ability, which will greatly lessen the burthen of taxation.

Viewing the subject in this light, we feel confident that the people of Ohio will not shrink from the exertion necessary to the vigorous prosecution of the noble enterprize in which we are engaged, and which has been, thus far, successfully prosecuted—in enterprize which has already raised the character of the state to a high standing abroad, and made her the admiration of her sister states—a work which will prove of incalculable advantage to the moral and commercial interests of the present generation, and extend its blessings to the latest posterity.

ISAAC MINOR,
T. WORTHINGTON,
BENJ. TAPPAN,
N. BEASLEY,
JOHN JOHNSTON,
ALFRED KELLEY,
M. T. WILLIAMS.

Columbus, December 10, 1825.

APPENDIX.

A.

SCHEDULE, Shewing the salaries, or wages, allowed to Acting Commissioners, Engineers and Assistants; and, also, the allowance made to each, for expenses while engaged in public service.

<i>Persons to whom allowance is made,</i>	<i>Salary or wages.</i>	<i>Allowance for expenses.</i>
Acting Commissioners,	Per day \$ 3 00	{ Per day while in public service, \$1 00 { Actual expenses to be paid by the state. { Actual expenses to be allowed whilst engaged in locating, and, \$3 00 per week while superintending line under contract.
Principal Engineer,	Per year 2000 00	
Resident Engineers,	Per year, 1000 00	
Senior Assistant Engineers,	Per month 45 00	Same expenses.
Junior Ass'ts and Surveyors,	Per month 35 00	Same expenses.

Time not devoted to public service to be deducted.

B.

REPORT OF NATHAN S. ROBERTS, ESQ. CIVIL ENGINEER.

To the Honorable the Board of Canal Commissioners of the state of Ohio:

GENTLEMEN—In compliance with a resolution of your board, and at the special request of David S. Bates, Esquire, your principal engineer, I have accompanied Messrs. Price and Forrer, engineers named in said resolution, for the purpose of making the necessary examinations and surveys to enable the board to determine which of the proposed routes between Coshocton and Lake Erie ought to be adopted as the line of the canal.

For this purpose, we have examined each of these routes, and compared the difficulties and most expensive parts on each line; and also have examined the route of the feeders, and the sources of their supply for the summits and other parts of these several routes. We first examined the Cuyahoga and Tuscarawas route.

We find that this line is located on ground very favorable for a canal, being mostly along alluvial bottoms, or on plains, of a soil composed of sandy or gravelly loam, which can be, in most places, readily excavated by the plough and scraper, which is the best way of constructing the banks of a canal.

The depth of cutting is very uniform, having but a small proportion of deep cutting or embankment; and the locks and other artificial works can be located, in most cases, to good advantage.

The quality of the grubbing on this route, is very favorable; about thirty miles of which, being on the plains, is very light—being of such description as the farmers get grubbed and cleared, fit for ploughing, for four or five dollars the acre; the remainder of the grubbing is usually heavy.

This line has a number of wash-banks and slip banks, of some difficulty. Along the Cuyahoga, their united length is one and three fourths of a mile; and on the Tuscarawas, they amount to four miles and six chains. In many cases, the materials, (earth and stone,) are near at hand, to form the canal by such places; in others, the materials are more distant and attended with more expense.

Most of these wash-banks must be protected by a stone facing or wall, on the out-side, to counteract the abrasion of the water, in time of freshes in the rivers. These are items of considerable difficulty and expense, and have been estimated accordingly.

A few rocky points are to be cut through, but of small amount. The artificial works, such as waste-weirs, aqueducts, culverts, dams, and guard-locks are neither numerous nor are they remarkably expensive: the materials, as stone of a suitable quality, are found very convenient in most places on this line.

The locks are estimated at the same price by the perch, on each of the lines. Lock-stone are found on the Cuyahoga and Tuscarawas line, of the first quality, for size and durability; they are a sand-stone, easily quarried and cut for useful purposes. The water-lime is found of good quality, near the canal line, in the valley of the Cuyahoga; this we examined and saw specimens of the cement.

As water is an indispensable article in all canal calculations, a certain and abundant supply of that element must be a primary consideration with every engineer, in locating a line of canal; and great caution should be made use of to ascertain the dependence which can be placed on those supplies by the public, for extensive commercial purposes; as the expense of constructing a great public canal is wholly predicated on enjoying, to its greatest extent, this safe, pleasant, easy, and cheap mode of transportation.

The Tuscarawas and Cuyahoga line is remarkable for the facilities by which it can be supplied with water, at the most favorable and necessary points. The line crosses the Tuscarawas river, which it takes in as a feeder, near the centre of the Portage summit. This stream is very durable, receiving its permanent supplies from a number of small lakes. These, together with the Portage lake, we have calculated will at all times afford an abundant supply for the summit and the lockage at each end. These feeders supply 200 cubic feet per minute, at low water; and in case of great emergency, a reservoir can be made, immediately adjoining the canal; by which the Tuscarawas, for four months, may supply 832 feet per minute more than its usual quantity. Such a reservoir, if practicable, could be equally applied to either route.

After descending north or south from the Portage summit, the canal is, at all necessary points, replenished by the streams which it takes in, or by feeders admitted from the Cuyahoga and Tuscarawas rivers; all which, except the Tuscarawas reservoir, are included in the estimates, as reported by the engineer and canal commissioners.

Killbuck and Black river route, examined.

The soil on this route is of an excellent quality, for the banks of a canal, being mostly alluvial on the route of the Killbuck; and down the Black river, a very fine loam or clay, which is very impervious to water, and is very good to excavate. The Killbuck line has some expensive items on the first ten or fifteen miles, consisting of deep cuts, high single banks by the side of steep side hills, banks to be raised in several places in the bed of the Killbuck, where it washes steep hills. The Killbuck is to be turned in a new channel in one place, of sixty chains, and the river is to be crossed, either by a dam or aqueduct, once or twice in the same distance. These wash-banks added together, make one mile in length; and although they are items which serve very much to increase the estimates of expense, yet they may be considered as perfectly safe when properly constructed.

Passing these, the line is very good, except that it often passes between the river and steep banks—the meanderings of the river often forcing the line of the canal on the side of a steep bank; and in many other places the line is very serpentine occasioned by the deep and broad deposits which are brought down the ravines, and spread themselves a great distance in a semi-circular form, into the bottoms, by which the lines are made both crooked and considerably more expensive. There are no appearances of slips on this line, and but two or three rocky points to cut through. The line for several miles below Wooster, passes through a wet prairie and an alder swamp of difficult excavation, but light grubbing; and above Wooster are several wash-banks, and the river must be turned once or twice to make way for the canal.

The same variety appears, on the generally very fine line, to the Harrisville summit. This line is generally heavy grubbing, and for the reason above stated, has more excavating and embanking than would be supposed necessary along a valley that appears as favorable. From the Harrisville summit, north, the line of the canal is along the valley of the Black river; and for about one mile is confined to the bottoms on the margin of the stream; but, by continuing the summit level, the valley falls by degrees below the canal level, and the line gradually approaches the top of the bank, or table of land on the east side of the valley, and for a few miles, crosses a succession of ridges and ravines, or deep valleys of small brooks, which occasions some deep cuttings and considerable embankments and a number of culverts.

At length, the line passes to the east of those ravines; and the face of the country becomes very regular—almost an inclined plane, with a descent

scarcely perceptible west and north. This inclined plane continues for many miles, and occasions much unavoidable excavation and embankment; as it is necessary in locating locks on such a line, to have deep cutting from the foot of each, about one third of the distance to the next, and about the same distance of embankment above the head of each lock, and so alternately for every lock; and as the locks are very frequent, it very much increases the expense over common cutting of suitable depth. The grubbing on the whole of this line may be called heavy, except the Harrisville summit and the prairie below Wooster.

There are no streams or springs of water from the Harrisville summit to the mouth of French creek, which can be admitted into the canal, but what will become dry in usual summer droughts. From the mouth of French creek, where the canal terminates at the Lake level, a towing path is to be made on the east margin of Black river, along several slaty wash-banks, and on some very favorable ground about five miles to the harbor at the Lake. The mouth of this river, as well as that of Cuyahoga, is much filled with sand; and both can be improved by extending a pier from the east shore across the sand-bars, a sufficient distance into the Lake. Such a pier, it is believed, will cause the current of the river to clear the sand out of its mouth, and cut through the bars into deep water, and prevent future deposits.

It is believed the above canal and its appendages can be made for the sum at which it is estimated in the reports. As the principal feeder for the Harrisville summit, and for supplying the canal from thence down the Black river, quite to the Lake level, is to come from the main Cuyahoga river to be taken from Kelsey's mill pond, in the township of Stow, and thence conveyed by an artificial channel forty miles, to the summit; it is proper to observe that, beginning at Kelsey's mill-pond, the first four miles of this feeder will consist of an embankment, in the bed of the river, for a considerable part of that distance, where it is from ten to fifteen feet below the bottom line of the feeder. A part of the above distance is a wash bank of rock; and in other places of sand and gravel, forty feet above the feeder. This bank, where built in the river, must be protected from abrasion by a facing of stone.

Soon after passing these difficulties, the country falls away, and the feeder must be built, for nearly two miles, along the face of a hill, which is as steep as the earth can stand, and about 100 feet high; composed apparently of sand and gravel, with some fragments of sandstone intermixed. Through this hill are some one or two deep ravines, as deep as the base of the hill, and of considerable width.

Judge Geddes has described this part of the line for the feeder, in his report, page 4, as follows:

"A feeder from this stream, at Kelsey's mill pond, in the town of Stow, as far as the Furnace village, would be seven and a half miles long, and pass over a country of most irregular formation. The sides of most of the hills, as steep as the earth can stand, making it impossible to carry the feeder, in any place, along the face of them."

But if this feeder ever is constructed, it must be along these steep slopes; it must be by a heavy cut from the top, of about fifty feet deep, and an embankment from the base, of the height of fifty feet; and embanking the ravines to the same height; in this way a channel may be cut out on the face of these hills. Towards the village of Middlebury the hills are not quite so steep.

At this place Mr. Geddes proposes to carry the feeder over the Little Cuyahoga, in an aqueduct, (see report, p. 5.) as follows:—"A very costly aqueduct must carry the feeder over the brook, in the Furnace village, to make way for which, some buildings would have to be removed. The top water line of this aqueduct would be eight chains, seventy-five links long, and twenty-eight and a half feet above the rocky bed of the brook."

Judge Geddes, in his report, has made no calculation upon the expense of constructing the above seven and a half miles of feeder, nor of the aqueduct at the Furnace village; neither has he noticed the soakage and leakage of water from a feeder thus situated.

The soil, on the whole of the above distance, is of a porous character; and the line of the feeder is wholly situated either on the side of steep banks and steep high hills, or on the top of embankments of unusual height. To undertake any calculation which might be made for waste of water, through the sides and bottom of a feeder, constructed in the usual way, and thus situated, must be considered, by all practical men, as the height of presumption and uncertainty.

As no part of the canal routes which I have examined, between Coshocton and Lake Erie, presents difficulties so formidable as those on the above feeder I will compare them with those difficulties on the New York canal, which they most resemble, viz: The Irondequot embankment, which is considered as one of the most hazardous works on that canal; for the security of which a lining of clay has been introduced, and safety gates, with proper sluices, have been constructed at each end; and, during wet seasons, the water is drained down every night. A superintendent is stationed there, whose special duty it is to regulate the height of the water, and prevent accidents to the banks. The remainder of this feeder is thirty miles, as estimated by Judge Geddes; he estimates three miles of it at ten feet cutting, through the Chippeway swamp, which is actually found to be eighteen feet cutting, for more than three miles. The estimates, as reported by the canal commissioners, will, probably, finish these parts of the feeder; and, though very expensive, may be considered safe when done.

The water which is to be relied upon to supply the Harrisville summit, and the canal north of the summit, to the Lake level, is to come from the following sources, as reported by the canal commissioners, and gauged by Judge Bates, principal engineer, viz:

	<i>Cubic feet.</i>
Cuyahoga river, per minute,	4,000
Tuscarawas, di to,	2,500
Wolf creek, ditto,	250
Portage Lake, ditto,	100
Chippeway Lake, by cutting down its out-let to six feet, during three months,	500
Killbuck, per minute,	90
Total cubic feet per minute,	<hr/> 7,440

Allow 100 boats to pass the summit per day, each boat will require two
Lock

locks of water, viz: $\frac{8 \times 15 \times 90 \times 2 \times 100}{24 \times 60} = 1500$ cubic feet per minute,
for lockage

There remains 5,940 cubic feet per minute, for evaporation, filtration, and all other contingencies which may happen between their sources and the canal.

The length of the feeder itself is $49\frac{1}{2}$ miles, to reach the canal; and, from a few miles above Wooster, 45 miles of canal to the mouth of

French creek, making in all
is an average of
mile. Add

$94\frac{1}{2}$ miles of canal and feeder; which
62.85 } cubic feet per minute for each
8.46 } for Little Cuyahoga.

71.31 }

The United States' engineers, in a late report to Congress, on the subject of canals, by making an average on five of the best canals in France; constructed, it may be presumed, with all the precautions and experience usually recommended by European engineers, and a section of the New York canal, constructed in the usual way, have made the expense of evaporation and soakage to be 58.13 cubic feet per minute, per mile.

But it is satisfactorily ascertained, that the New York canal consumes and requires nearly double that quantity; and it is but safe and proper to calculate that *another* canal, constructed on the same principles, and on the same diversity of soils and situations, which will require and expend an equal amount of water. It has been correctly ascertained, that on certain levels and summits of the New York canal, the following amount of water is necessarily expended, after deducting reasonable allowance for lockage.

	Cubic feet.	Cubic feet.
On 61 miles, from Rochester to Seneca river,	5,500	— 90.16
11 miles, Camillus summit, used four years,	1,100	— 1.00
69½ miles, Rome summit, used five years,	8,100	— 106.54
141½ miles, on which was expended, per minute,	14,700	} equal to 03.18 per mile

The above facts were obtained by your acting commissioners, from their own personal observations, and from the engineers and superintendents on the New York canal.

The following guages, by Judge Bates, at Rochester, were taken in 1824, with great care.

On 57 miles, from Rochester to Cayuga,
20 miles, west to Brockport,
2 miles of feeder,

79 miles of canal and feeder, received 8,000 cubic feet per minute, equal to 101.26 cubic feet per minute, per mile.

In August the same year,

On 20 miles, from Rochester to Brockport, 2,100 cubic feet per minute; equal to 105 cubic feet per minute, per mile.

From the above statements and guages, it is ascertained that something more than 100 cubic feet of water per minute, is expended on the above sections of the New York canal, for evaporation, absorption, and leakage, per mile. The above guages were made with as much accuracy and care as the nature of such cases will permit, and are believed to be no more than a fair average of the necessary quantity of water used on the New York canal, during the summer and fall months.

Kilbuck, Chippeway, and Cuyahoga Route.

As the Kilbuck and Cuyahoga sections have been considered, that part which connects them through the Chippeway swamp, may be considered. Having viewed the most difficult part of this line, I am of opinion that it cannot be completed for a less sum than the estimates. This route depends for its supply of water from the same source—that is, by the Cuyahoga feeder, and its appendants and tributaries. But being thirty-five miles shorter, by deducting the Black River line the whole quantity introduced by that feeder would be for the supply of sixty miles of feeder and canal, which would be equal to ninety-nine cubic feet per minute, per mile, for soakage, evaporation, and leakage, after deducting lockage water for 100 boats to pass the summit per day.

AN ABSTRACT,

Shewing the amount of each item of expense to be incurred in constructing the Ohio Canal, from Coshocton to Lake Erie, by each of the proposed routes.

BY THE FIRST ROUTE.—TUSCARAWAS AND CUYAHOGA.

First Section—from Coshocton to Portage Summit, 94m. 13ch. 55.

Grubbing and clearing, } preparatory }	3,643—at 7 50—27,322 50	
On barrows	3,044—at 5 00—15,220 00	
		<hr/>
Excavation	2,460,517 cubic yards	\$42,542 50
Embankment	895,776 ditto	277,297 39
Protecting walls, at wash- } banks, &c. }	23,050 00 ditto	147,446 70
Culverts; in number	25, from 4 to 20 feet chord,	23,050 20
Lockage, 205 feet	205 ft. lift, 37,601 perches,	9,420 41
Aqueducts; in number	2	131,746 39
Dams and feeders		24,931 09
Road bridges	18	2,421 00
		2,800 00
		<hr/>
		\$664,035 68

Distance 94 ms. 13 chns. 55 lks. the average cost per mile is \$7,072 69 cts.

Second Section—from Portage Summit to the Lake at Cleaveland.

Grubbing and clearing, } preparatory }	2,005 chains, at \$7 50—	17,123 25
Excavation	1,687,162 yards, at various—	125,839 86
Embankment	274,648 do. at do. --	44,235 06
Protecting walls to wash-banks	12,522 do. at \$1 00--	12,522 00
Culverts; in number	12, from 4 to 10 ft. chord,	4,309 13
Lockage, 394 feet	70,716 57 perches, at \$3 50—	247,661 96
Aqueduct	1 at Peninsula	2,700 00
Dams and feeders		700 00
Road bridges; in number	11 and changing road	1,410 00
Tow-path down Cuyahoga		4,690 00
Harbor, at mouth of Cuyahoga		5,000 00
		<hr/>
Total		\$466,197 26

Distance 38 miles, 8 chains; \$12,236 14 average, per mile.

Total distance from Coshocton to the Lake, by this route, is 132 miles, 21 chains, 55 links; total amount of lockage is 599 feet; and the total amount of expense is estimated at \$,132,232 94; the average cost per mile is 8,560 00.

SECOND ROUTE.—KILBUCK AND BLACK RIVER ROUTE.

First Section—from Coshocton to Kilbuck Summit. 63m. 11ch. 50 links.

Grubbing and clearing, } preparatory }	4,037.50 chains, at 7 50—	\$30,281 25
Excavation	1,950,256 cub. yds., various,	205,250 96
Embankment	765,146 do	144,479 93
Protecting walls, for wash-banks	7,280 do. at \$1 00—	7,280 00

Culverts; in number	17	4,177 54
Lockage; 44 feet	26,258.92 perches, at \$3 50—	91,906 22
Aqueducts, none		
Dams, and feeders, and tow-path bridges		8,561 00
Road bridges; in number	11	1,210 00
Guard locks	3	3,600 00

Total \$496,146 90

Distance, 63 m. 11ch. 50 links; average cost, per mile, \$7.857 87½

Second Section—from Kilbuck Summit to the Mouth of Black River.

Grubbing and clearing, } preparatory	2,593 25 ch. at \$7 50	\$19 447 88
Excavation	1,199,012 cub. yds., various—	130,418 86
Embankment	554,718 do. do. —	76,778 84
Protection wall, on wash-banks, none.		
Culverts; in number	31	17,368 86
Lockage, 333.7 feet	60,389.91 perches, at \$3 50—	211,364 32
Aqueducts, none		
Dams and feeders, none		
Road bridges	10	1,100 00
Tow path to the mouth of Black River		4,000 00
Harbor, at the mouth of Black River		5,000 00

Amount \$465,478 82

Distance, 35m. 2ch. 69 lin.; aver. cost, per mile, \$13,286 85.

To this add Cuyahoga feeder, 49m. 40ch., cost. 378,618 84

Total distance,	Canal, 98m. 14ch. 19 links	
	Canal and feeder, 147 54 19	
average cost, \$9.075 51.	Amount	\$1,340,244 56

The total am't of lockage on this route is, 447 $\frac{7}{16}$ feet; total expense as above.

THIRD ROUTE—BY KILBUCK, CHIPPEWAY, AND CUYAHOGA.

From Coshocton to Kilbuck Summit, as above stated, \$496,146 90

From Kilbuck Summit, through Chippeway Swamp. to Portage, the distance is stated at 33m. 27ch.; the average expense, per mile, is \$9.900 18 377,196 99

From Portage Summit to Cleaveland, as above 466,197 26

\$1,339,541 15

Whole distance, 134 m. 46ch. 50 lin.; aver., \$9,953 49

To this amount add expense of Cuyahoga feeder 127,531 12

Amount \$1,467,072 27

Total average cost per mile, \$10,901 11.—Total am't. of lockage is 599 feet.

General Abstract from the preceding.

FIRST ROUTE. <i>Cuyahoga and Tuscarawas.</i>				SECOND ROUTE. <i>Kilbuck and Black River.</i>			THIRD ROUTE. <i>Kilbuck and Cuyahoga by Chippeway and Portage.</i>		
Lockage	599 feet.			477.7 feet.			599 feet.		
	m.	ch.	lin.	m.	ch.	lin.	m.	ch.	lin.
Length of Canal	132	21	55	98	14	19	134	46	50
				Feeder, 49	40	00	11	40	00
				147	54	19			
Cost, per mile,	\$8,560 00			\$9.075 51			\$10.901 11		
Total expense	\$1,132,232 94			\$1,340,244 56			\$1,467,072 27		

To the above estimates should be added ten per cent. for contingencies and superintendence. By examining the book of estimates, it has been ascertained that several omissions had happened in carrying out &c. Some addition to the estimated price of the protecting walls has been made. It is believed that the above statements contain a fair and correct valuation of the several items of expense, (with the additions above mentioned) and of the distance and amount of lockage, on each of the proposed canal routes.

Having duly examined and compared the relative merits of the three routes of the canal, from Coshocton to Lake Erie, and compared the expense of constructing them, it appears that the route by the vallies of the Tuscarawas, Portage lake, and Cuyahoga river, is the most feasible, and can be constructed at a less expense by the mile, and for the whole distance, than either of the other routes in question; and I have good reason to believe, can be completed for the sum at which it is estimated.

As it respects an ample supply of water on these several routes, I would observe, that the LINE above described can be supplied with greater certainty than either of the others; requiring no additional expense; and its feeders will always be perfectly safe, and can never be diverted from the canal into any other channel.

The route by the Kilbuck, Chippeway, and Cuyahoga, MAY be supplied with water, at the great expense, as contemplated, to which, in justice, should be added the great amount of private damages, done to individuals; beside the irreparable loss to community, by diverting from its channel one of the most durable and useful streams for hydraulic purposes, and on which great dependence is placed in dry seasons, by a great extent of country. But the certainty and quantity of this supply may, however, be doubted, considering the hazardous character of the channel of its feeder; elevated on steep side hills, and high embankments of porous soil, for eight miles from its commencement; and also the various ways which water is lost or diminished: as by draining of swamps and low grounds; the natural reservoirs of streams, in new and unimproved countries especially.

Being fully of opinion, from the best calculations I have been able to make on other canals, that not less than 100 cubic feet of water per minute, per mile, beside the necessary lockake water, ought to be relied upon for the Ohio Canal.

If this is a correct position, it is evident that the line of canal by the Kilbuck and Black River, cannot be amply or sufficiently supplied with water, even if a certain dependence could be placed upon the contemplated feeder and its resources

All of which is very respectfully submitted,

NATHAN S. ROBERTS, *Civil Engineer.*

Wester 5th, May, 1825.

RECAPITULATION, shewing the aggregate amount of work of the various kinds under contract north of Portage Summit, the average price, and total amount in money.

DESCRIPTION OF WORK CONTRACTED.	AMOUNT OF EACH KIND OF WORK.	AVERAGE PRICE OF THE VARIOUS KINDS OF WORK.	Tot. amt. of each item in money.
Grubbing and clearing	2695 chs. 80 lks. 33 ms. 55 3-10 chs.	\$6.65 ¹ pr chn. \$5.32, 13 6-10 pr mls	17,931 89
Earth excavation	855,189 cubic yards	08 57-100 per cu yd	73,318 87
Rock excavation	12,500 do. do.	,24 88-100 do. do.	3,110 80
Embankment	345,166 do. do.	,11 3-4 do. do.	40,615 45
Lock-pit excavation—earth	59,976 do. do.	,16 64-100 do. do.	9,982 69
do. rock	3,489 do. do.	,70 9-10 do. do.	2,473 75
Locks	67,014 perches, 373 feet lift	2,87 8-10 pr pch 517,12 35-100 pr	192,888 10
Aqueducts, mason work, abutments and piers	3,531 perches	1,87 8-10 per perch	6,632 00
Wood trunks of do.	Length 296 feet	4,66 9-10 per foot	1,392 00
Foundations of square timber		Aggregate	210 00
Culverts, mason work	3,014 perches	1,96 42-100	5,920 12
Square timber in foundations	10,460 feet.	,02 63-100 pr foot when laid	275 20
Protection moles } Square timber	94,863 feet	,03 82-100 do. do.	3,626 07
of crib work } Round do. for ties	43,854 feet	,01 78-100 do. do.	770 02
Filling cribs with stone and gravel	16,681 cub. yards	,16 2-10 per cubic yard	2,701 39
Protection walls of stone	3,510 perches	,28 8-100 per perch	985 90
Piles for protection of banks	1,325 piles	,35 85-100 pr pile when driven	475 00
Piles in lock pits	1,050 do.	do. do.	850 00
Dam and waste weir			250 00
Miscellaneous items, not included under the above heads,		Aggregate amount	2,540 42
Total			366,939 67
To the above should be added the expense of building fifteen road bridges over the canal, not yet contracted, and } not included in the above abstract, at an average cost of \$180,00, including embankment for abutments,			2,700 00
			\$369,639 67

Average cost per mile, including locks	\$10,971 19
Average cost per mile, exclusive of locks	<u>4,851 44</u>
The estimated cost of the line from the old Portage Bridge to Lake Erie, agreeably to the estimates submitted to the last General Assembly,	\$446,033 21
To which add ten per cent. to cover expenses of superintendencies and contingencies, agreeably to last winter's report,	<u>44,603 32</u>
Total amount of cost, agreeably to the original estimates,	490,636 53
From which deduct the estimated expense, per original estimate, of line between the above points not under contract	\$48,509 31
Also ten per cent. on the amount to cover contingencies, &c.	<u>4,850 23</u>
Total amount to be deducted for line not under contract	<u>53,360 79</u>
Cost of line now under contract, agreeably to the estimates submitted to the last General Assembly,	437,275 74
Estimated cost of line now under contract, agreeably to late surveys, at contract prices, including estimate for road bridges	<u>369,639 67</u>
Saving to the state from the original estimates	<u><u>\$67,636 07</u></u>

D.

RECAPITULATION,—*shewing the aggregate amount of each of the various kinds of work performed on 33 miles 55 $\frac{8}{100}$ chains, of canal line, under contract, north of Portage summit, previous to Nov. 20. 1825.*

Kinds of work performed.	Amount done.
Grubbing and clearing	1,797 $\frac{8}{100}$ chains 22m. 37 $\frac{8}{100}$ ch.
Earth excavation, in canal,	13,313 cubic yards
Ditto, in lock pits,	28, 40 ditto
Total amount of earth excavation	164,453 cubic yards
Rock excavation, in canal	70 cubic yards
Ditto in lock pits	640 ditto
Total amount of rock excavation	710 ditto
Total amount of excavation	165,163 yards
Embankment	44,760 cubic yards
Ditto, stone and gravel in crib work	393
Total amount of embankment	45,153 yards
Locks commenced, three; stone work laid in ditto	1,744 perches
Foundations of locks laid, three; walls not commenced	
Face stone for locks, cut and delivered	17,102 feet
Ditto, cut and not delivered	1,334 do.
Total amount cut and not laid	18,436 feet
Ditto quarried and delivered, not cut	5. 40 feet
Ditto, ditto, not delivered, not cut	22,678 feet
Total amount quarried and not cut	27,818 feet
Total amount of face stone quarried, not laid	46,254
Stone for backing lock walls and for aqueducts delivered	4,140 perches
Ditto, quarried and not delivered	2,235 ditto
Total amount of ditto, quarried and not laid	6,375 perches
Timber procured and laid into cribs	5,540 feet
Ditto, hewed for cribs and culverts	22,900 feet
Ditto, ditto, for lock foundations	37,100 feet
Total amount of timber not laid	60,300 feet
Total amount of timber prepared	65,840 feet
Files for lock foundations, delivered	600
Castings for lock, delivered	5 tons and 750 pounds
Clearing for basons	28 acres

E.

RECAPITULATION, shewing the several kinds of work under contract on the Licking Summit—amount of each kind—and the average price as contracted.

Licking Summit, 10 miles, 36 chains—Reservoir bank, 2 miles 23 chains.—Total under contract, 12 miles 59 chains.

THE KINDS OF WORK.	AMOUNT OF EACH.	AVERAGE PRICE AS CONTRACTED.	
Grubbing and clearing	{ Canal line, 10 miles, 36 chains, Reservoir bank, 2 miles, 23 chains, Extra grubbing for the reservoir and other banks,	\$6.59 per chain	6,718 58
Excavation	280,508 cubic yards	at an average of 8½ cents nearly	7,713 58
Embankment	408,957 do.	do. 1½ cents 1 mill do.	24,096 28
Culverts, seven in number	1,687 perches of stone work	will cost, say \$3.00 per perch	45,632 28
Aqueducts, one, S. fork Licking	771 do. do.	do. 3.00	5,061 00
	100 feet of wooden trunk	per foot run 6.00	2,913 00
Total canal line and reservoir			<u>\$85,416 14</u>

To this amount may be added the cost of three road bridges not under contract, estimated at \$180, each, including embankments

540 00

\$85,956 14

Average cost per mile, including the extra cost of one and a half miles of the reservoir bank which is connected with the canal, \$6,3 0 nearly

The above line, including the reservoir was estimated in the last report of the board to the Legislature, at \$93,356 25

To which add ten per cent. to cover contingencies, as stated in said report, 9335 62

Total amount of former estimate, 102,691 87

From which deduct the amount of the above abstract, at contract price, 85,956 14

Leaving a balance in favor of the contract prices of \$16,735 73

Since the reservoir embankment has been placed under contract, it has been deemed advisable to place a wall of timber in the centre of the bank, to guard against the operations of the muskrats and craw-fish. This is an additional item of cost, which was not included in the original estimate; and is not included in the above statement, because its amount is not known. It is to be paid for at the appraisal of the principal engineer.

The price of the culverts and aqueduct is not fixed in the contracts. They are to be paid for at the estimate of the principal engineer. At the time of the sales, it could not be determined where the stone could be obtained. It is believed; they can be built at the price stated, which is fifty per cent. above the estimate.

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY, BY JOHN KILBOURN, AT \$3 A YEAR, IN ADVANCE.

VOL. I. COLUMBUS, OHIO, SATURDAY, SEPT. 20, 1828.

NO. 14

PUBLIC LANDS.

One prominent cause of the present rapid settlement of the new lands, in the western states; and particularly in Ohio, is, the excellency of the present land system of the United States.

By this system, the public lands are sold to individual purchasers, in tracts of eighty acres each; for \$1 25 per acre—making \$100 for each eighty acre tract. The purchase money, in all cases, to be paid in advance, before the deed, or patent from the general government will issue.

With this excellent system which precludes extensive land speculation, considerable numbers of our fellow citizens, in Missouri, and other western states, have become dissatisfied; and have got up a very plausible project for a new mode of disposing of the public lands; which is to graduate their price, so that after they shall have been held one year at \$1 25 per acre, that they shall then be lowered to \$1 00 an acre, and after standing at \$1 00 for one year, be then lowered to 75 cents, and so down, until the fourth year, they will be held by the General Government, at only 25 cents; and after they shall have been held one year at 25 cents, then all lands not sold, are to revert to the states in which they are respectively situated.

We believe that this scheme, as plausible as it may seem, would result in one of the greatest fields of speculation, which has ever been witnessed—to which the Yazoo speculation was a mere nothing. The reasons for which belief we intend to give, in some future number. In the mean time, it is to be hoped that very few members of Congress, from Ohio, will be found supporting this system, which, if adopted, will most assuredly prove the nucleus of extensive manors, lordships, &c.

Although we take no part in the political contests of the day; yet, on so momentous a question of public policy, deeply involving the welfare of millions of the human family, to the latest posterity, as does the plan here adverted to—we feel no hesitation in saying that every man who wishes for the perpetuity of a republican form of government; ought to withhold his vote from any candidate to the

national legislature, who should avow himself in favor of this ever to be deprecated project.

From the Pennsylvania Gazette.

Rail Roads are increasing in favor in England. "We have before us animating accounts of the opening of the Lancashire, (England,) Bolton and Leigh Rail Road." A large concourse of persons attended and partook of a prepared repast. We must reserve the details for another day, having at present room only for a short extract or two which follow.

LIVERPOOL, Aug. 2.—*Opening of the Bolton and Leigh Rail Road.*—Yesterday, this great and useful undertaking being nearly completed, the road was opened in turn, by the passage over it of a chained row of coal carriages, some of which were tastefully fitted up for the reception of a select company of the friends of the proprietors, drawn by a locomotive steam engine.

We venture to announce this as one of the most important and decisive triumphs of modern science.

Attached to this locomotive engine were seven wagons, elegantly embroidered inside, strongly and heavily built, each containing a steward and dozen to eighteen persons, males and females. Linked to the last of these wagons was a ponderous vehicle, a coach belonging to the Liverpool and Manchester Company, built on the French *diligence* system. It is intended to carry sixteen inside and four outside; but on this occasion there were at least a dozen on the roof. Immediately after came six more wagons, also filled with company; the last one containing the members of the Bolton old band, who played various national airs and marches at intervals.

A belief was entertained and expressed, that Rail Roads with locomotive engines would supersede the use of Canals in England.

[From the New England Farmer.]
AMERICAN LYCEUM

This institution proposes a system of mutual instruction, fitted to the towns and villages in New England, and other parts of the country. The instruction is to be conducted at weekly or occasional meetings for reading, conversation, discussions, dissertations, illustrating the sciences, or other subjects of useful knowledge, or popular, *practical* education.

To aid these exercises, it is proposed to have each branch or town Lyceum, supplied with books, simple articles of apparatus for illustrating the sciences, and their application to the business of the farmer, mechanic, or civil

engineer; also, specimens of Natural History, viz: Geology, Mineralogy, and it disposed, in Botany and Zoology.

This collection is to be made with reference to the various classes of society in a town, and deposited in some central place, where persons from all sections of the town, and of various pursuits and ages, can meet, according to arrangements made to accommodate the whole.

At one time, school teachers can meet, and discuss or illustrate subjects relating to their profession, and consequently for the benefit, not of themselves, but of their schools, and through them, for the benefit of the community and the world.

At the same or another time misses and lads young ladies and gentlemen, who frequently waste their time in schools with little children, or have passed the age for common school instruction, may meet, and receive in a weekly or semi-weekly course of exercises, among themselves, or under the assistance of regular teachers, a clergyman, a lawyer, a physician, a farmer, a mechanic, a merchant, or any gentleman or lady competent, and disposed to teach, instruction fitted to their age, pursuits and wants.

At the same place, and with the same opportunities, farmers can meet, to bring together their own views and experience, and compare them with those related by authors upon the subject of consideration, it having been adopted at a previous meeting. By the aid of apparatus and tests, the correctness of views or principles may, perhaps, be tried by actual experiment.

Mechanics can also make use of the same place, library, apparatus and specimens, to illustrate subjects, and prove or test principles, which they daily use, and a knowledge of which would increase both their satisfaction and success in their useful pursuits.

Societies of females, for literary or benevolent purposes, might improve the same opportunities, to give interest to their meetings, and greater efficiency and usefulness to their exercises.

Besides exercises fitted to the pursuits of the wants of particular classes of society, others of a more general or popular character may be introduced, such as popular lectures on the sciences, or any other subject of useful knowledge and common interest; and these either by a citizen or citizens, or by some one employed from abroad for the purpose.

To strengthen and facilitate the operations of the several branch Lyceums, all in a county are to be united by a Board of Delegates, who are to meet semi-annually, to adopt regulations, and forward measures for the general and mutual benefit of the whole. A County Lyceum is intended also to adopt measures for the benefit of schools in their district—to collect facts respecting their state and their wants, suggest improvements, and perhaps act as a Board of Examiners of school teachers in the county, and of course to take the place of town committees for that object.

Each County Lyceum in a state is to appoint one or more representatives, to meet perhaps during the session of their Legislature, to organize and adopt measures to advance the interests of education. A State Lyceum may

act as a Board of Education: and by appointing committees for specific objects, viz: one to examine and recommend school books; another to determine upon the most essential branches in a system of popular education; the proportionate time and attention proper to devote to each; the order in which they should be introduced, and the most efficient methods of inculcating them.

Not only the various subjects of instruction, but the different faculties of the mind, viz: judgment, memory, temper and imagination, might justly come under the consideration of this or another committee. The object of such a committee would be to give both efficiency and symmetry to education.

From several State Lyceums a General Union might be formed, to be called the American Lyceum, and to perform the duties of an American Board of Education, in the most extensive sense of the word.

Under the patronage of the American Lyceum may be published a Journal, or the Journal of Education; small, familiar and practical treatises on the sciences; scientific, biographical, or historical tracts, &c. for the benefit of the various town lyceums, schools, workshops, taverns, steam boats and private families.

More than fifty societies upon this plan are already formed, and from the greater or less success which has uniformly attended their operations, and from the great increase of strength and efficiency which an extensive and GENERAL UNION of the plan could not fail to give to individual efforts, it is most earnestly hoped that every town and village in New England, at least, will take the subject into early and serious consideration, to determine whether they cannot, during the approaching autumn and winter, participate in spirit, and engage in the exercises, that they may enjoy the benefits of an institution designed for the diffusion of knowledge and the benefit of the world.

PERIODICAL LITERATURE.

THE editor and publisher of this paper is duly authorized to receive subscriptions, and to receipt for all moneys therefor, for the following works, published quarterly, each, at \$5 a year in advance, namely:

North American Review,
American Quarterly Review,
American Journal of the Medical Sciences.

—Also—

The following monthly publications, at \$4 a year in advance, namely:

Museum of Foreign Literature,
Journal of Foreign Medicine,
Religious Magazine.

—Likewise—

Franklin Journal and Mechanics Magazine,
at \$5 a year, in advance.

All the abovementioned works are published in Philadelphia; excepting the *North American Review*, which is published in Boston.

—Likewise—

The Western Monthly Review,
Published in Cincinnati, at \$3 a year.

F.

RECAPITULATION, shewing the several kinds of work under contract on the Miami Canal, from Middletown to Cincinnati, (42 miles,)—amount of each kind—and the average price as contracted.

THE KINDS OF WORK.	AMOUNT OF EACH.	AVERAGE PRICE AS CONTRACTED.	TOTAL.
Grubbing and clearing	3,360,87 chains, 42 miles	\$4.06 $\frac{1}{2}$ pr. chain, or about \$327 pr. m.	\$ 13,735 38
Excavation	1,519,133 cubic yards	average cost per yard	118,959 32
Embankment	688,628 do. do.	do. 7,17 cents	69,159 50
Culverts, 26,	8,083 perches	do. 10.04	16,731 42
do. Pits, foundations, &c.	estimated to cost	perch 2,07	10,272 00
Locks, 2, (100 feet lockage,)	18,910 perches of masonry	do. per perch 4.00	72,640 00
Excavation of lock-pits,	17,350 cubic yards	do. yard 14.38	2,495 00
Aqueducts	9,882 perches of masonry	do. perch 1.88 $\frac{3}{4}$	18,559 00
Wooden trunks	478 feet	foot run. 703.04	3,361 50
Excavations of pits and foundations,	estimated to cost		4.00 00
Waste wiers	22		1,430 00
Road bridges, wood work	do.	\$104.00 each	2,295 00
do. do. Embankment	1,200 feet	nearly 68.00 each	1,497 80
Wall of timber in the river	4,300 yards	do. 67 pr. foot	804 00
Pavement, or protection wall.		do. 36 pr. yard	1,554 00
Miscellaneous items, such as stone walls, cherting the channel of creeks, land drains, &c			1,810 22
Mucking the whole length of the forty-two miles, 246,000 cubic yards, at eight cents,			19,680 00

Total cost,

\$359,680 14

Average cost per mile, of forty-two miles, including
twelve locks,

\$8,547 24

The locks in the above abstract are placed at \$4 00 per perch. They were mostly contracted for to be built of timber, but have since been changed, and are to be built of stone so far as it can be obtained at reasonable expense.

The line from the Ohio River to the Miami, near Middletown, on the low level, was estimated in the last report to cost

\$381,140 00

To which add the difference in the cost of the high level, as estimated

45,000 00

426,140 00

To which add ten per cent. to cover contingencies, as stated in the report

42,614 00

Total cost, as estimated

468,754 00

Amount of contracts as above shown

358,984 14

Estimated amount of line, not under contract, to the Ohio

75,926 00

Ten per cent. to cover contingencies on the above item

7,592 00

442,502 14

Balance in favor of contracts

226,251 86

It will be recollected, when examining this comparative statement, that on the locks in this line there is no saving from the estimates, owing to the scarcity of stone; and that the first ten miles of the canal, below the feeder from the Miami, is constructing with an increased depth of one foot, and increased width of three and a half feet, and the next fifteen miles with an increase in depth of six inches, and in width of one foot, nine inches.

The estimates of last year, were made for a canal of the usual dimensions.

G.

FORM OF AN AGREEMENT.

ARTICLES OF AN AGREEMENT, made and concluded this — day of — in the year — between — of the one part, and the canal commissioners of the state of Ohio, for and on behalf of the said state, of the other part, whereby it is covenanted and agreed as follows, to wit: the said part — of the first part contract and agree to construct, in a good, substantial, and workmanlike manner, all that part of the line of the Ohio canal, which is included in section — reference being herein had to the location and map of the said line made by — engineer agreeably to the following plan, that is to say: First, in all places where the natural surface of the earth is above the bottom of the canal and where the line requires excavation, all the trees, saplings bushes, stumps and roots shall be grubbed and dug up at least sixty feet wide; that is, thirty three feet on the towing path side of the centre, and twenty-seven feet wide on the opposite side of the centre of the canal, and together with all logs, brush and wood, of every description, shall be removed at least fifteen feet beyond the outward line of the said grubbing on each side; and on said space of fifteen feet on each side of said grubbing, all trees, saplings, bushes and stumps shall be cut down close to the ground, so that no part of any of them shall be left more than one foot in height above the natu-

ral surface of the earth, and shall also, together with all logs, brush and wood of every kind, be removed entirely from said space. And the trees, saplings, and bushes shall also be cut down twenty feet wide on each side of said space so as to be cleared, and also all trees which in falling would be liable to break or injure the banks of the canal. And no part of the trees, saplings, brush, stumps, wood, or rubbish of any kind, shall be felled, laid or deposited on either of the sections adjoining this contract. Second: The canal and banks shall be so constructed and formed, by excavation or embankment, as either or both may be necessary, in order to bring the same to the proper level, as designated by the engineers or either of them in the employ of said commissioners, so that the water may in all places be at least forty feet wide in the canal at the surface, twenty six feet wide at the bottom, and four feet deep: each of the banks shall be at least two feet, perpendicular measurement, above the top water line; and such a slope shall be preserved on the inner side of the banks, both above and below the top water line, that every foot perpendicular rise in said banks shall give a horizontal base of one foot nine inches: the towing path, which shall be made on such side of the canal as said commissioners or either of them, or any engineer in their employ may direct, shall be at least ten feet wide, at its surface, and not more than five feet in any place above the top water line; and whenever a difference in the elevation of the towing path shall occur, the ascent or descent shall not be greater than one foot rise or fall in any sixty six feet in length, and shall be gradual: the towing path shall be smooth and even, shall be composed of the best materials which the adjoining excavation will furnish, and shall be so constructed that the side next the canal will be six inches higher than the opposite side, at the surface, with an uniform and regular slope, so that the water may run off from said path: in all cases where the materials excavated shall raise a spoil bank immediately back of the towing path above its exterior surface, sluices or passages for the water shall either be left or cut through said spoil bank as frequently as one in every five chains, so that the water may readily drain off from the towing path in an opposite direction from the canal: the bank opposite the towing path shall in no place be less than five feet wide at the surface; shall be smooth and even; and neither of said banks shall have a slope of lesser base in proportion to its height on the outer than on the inner side, except where there is a redundancy of stuff increasing the width of the bank beyond the requisition aforesaid: all loose and porous materials, and those which are perishable or permeable to water shall occupy the outer extremities of the banks, and for the distance of at least ten feet, measured outwardly from extremity of the top water line on each side, the banks shall be composed, both above and below the top water line, of the most pure, solid, compact and water tight earth which the adjoining excavation can supply; and no vegetable mould, leaves, roots, grass, weeds, herbage, logs, sticks, brush, or any other substance of a porous or perishable nature, shall be left, laid or in any way admitted into the said space of ten feet last described. Third: In all cases of embankment, and where the bottom line of canal is above the natural surface of the earth, all the trees, bushes, saplings and stumps, on the space to be occupied by the canal and its banks, shall be cut close to the ground, and, together with all logs, brush and wood of every description, shall be removed from a space of at least forty five feet wide on each side of the centre of the canal; and from a strip fifteen feet wide under each bank to be so situated that the inner side of said strip shall be perpendicularly under the outer extremity of the top water line, all the trees, bushes, stumps and roots shall be thoroughly grubbed, and, together with all the logs, brush, roots, grass, herbage, vegetable and porous earth, shall be removed entirely without said banks, so that the banks may unite securely with the solid earth beneath.

And the said part of the first part further covenant and agree to build, found and erect, in a good, substantial and workmanlike manner, lock number — as designated on the surveys, plans, and profiles of — engineer, in the following manner, viz: The lock shall be so constructed that the chamber will be 90 feet in length and 15 in breadth in the clear. The walls of the lock shall be of solid masonry laid in water cement, and well grouted with water cement as frequently as once in every two feet, as the walls progress in height from the bottom. The walls shall be five feet in thickness at the bottom of the lock, and four feet at the top water line of the upper canal, with buttresses firmly united and connected with the main wall, and rising from the bottom of the lock to the top water line, four feet in length each and extending back from the main wall four feet. These buttresses shall be 12 feet apart, (measuring from centre to centre.) Buttresses shall be so built that 20 feet in length of the walls opposite the upper gates, and 17 feet in length opposite the lower lock gates shall be 9 feet thick at bottom and 8 feet at the top water line. The face of the walls shall be laid in courses; the stone forming each course to be of uniform thickness throughout the course, well bedded and the joints well cut, so as to make tight joints at least six inches back from the face of the wall. The face of the stones shall be rough cut or hammer dressed, except the hollow quins, which shall be cut smooth and true, agreeably to a pattern to be furnished by the engineer. When the face stone are of coarse sandstone or freestone, each course shall be at least one foot in thickness, and in all other cases not less than 10 inches. No face stone shall have in any place less than one foot bed, and in no case less bed than face. Binders or headers shall be placed in each course, extending from the face back through the main wall, so as not to leave more than ten feet in any place between headers. The headers in each successive course shall be placed over the space between the headers in the next course beneath; and the face stones shall not be more than half an inch thinner on the back than on the face: culverts, to be formed with stone cut to the proper pattern, shall be constructed in the walls to pass the water from the upper canal into the chamber of the lock, with proper gates, all to be of such form and dimensions as the engineer having charge of the work may direct. The walls shall be covered with a coping of firm, solid stone, of not less than three feet in width, well cut, jointed and bedded, and these next the gates securely cramped together with iron cramps. The lock gates, paddle gates, and mitre sills shall also be formed and made agreeably to the plan to be furnished by David S. Bates, Esq. or other engineer in the employ of the commissioners; and all the gates shall be formed of such materials as such engineer may direct. The foundation of the lock, unless a smooth and firm rock foundation can be obtained, shall be composed of solid white oak timber, hewed square, and one foot in thickness, to be laid horizontally across the foundation, level and even, as near together as such engineer may direct, and well puddled between the timbers, and covered with three inch white oak or pine plank, free from knots, rots or shakes, well jointed and firmly trunneled or spiked to the timber beneath; a flooring composed of two inch white oak or pine plank, free from rots, knots or shakes, well jointed and securely spiked with spikes ten inches in length, shall be laid throughout the whole chamber of the lock. Wherever the resident engineer or other engineer in the employ of the commissioners, may direct, piles, of such dimensions and in such numbers and places as the said engineer may direct, shall be driven into the lock pit, in order to form a firm and secure foundation for the lock. One or more rows of sheet piling, as the principal engineer, or other engineer in the employ of the said commissioners, may direct, to be formed of good, sound white oak, well jointed, and of such length as such engineer may direct, shall be driven into the ground across the foundation

of the lock, and the bank at the breast and sides of the lock shall be well puddled with good, solid, water tight materials, agreeably to the directions of such engineer.

And the said part — of the first part further covenant and agree to erect and build, in a good, substantial and workmanlike manner, a culvert or culverts in such place or places, and of such form, dimensions and plan, as the commissioners or either of them, the resident engineer, or any other engineer in the employ of said commissioners, may direct, which shall in all cases be built of good substantial stone, laid in water cement, and made true and smooth, on the outer as well as in the inner side. And the said part — of the first part further agree to construct a mole or pier of such breadth and height as said commissioners or the engineer having superintendence of the work under them may direct, along the wash or slate banks on said section. Said mole shall be formed of good, solid, durable timber, of which that forming the sides of the mole shall be well hewed, and shall be at least twelve inches square and at least 25 feet in length; the sides shall be laid perpendicularly and securely connected together with ties not less than 10 inches in diameter, clear of bark, which shall be let into the side timbers with a dove tail and square shoulder at each end well fitted to said timbers so as to prevent their moving or sliding upon each other. Each tie shall be let into the timbers, on which it rests, half the thickness of the dove tail at the end, and the other half shall be let into the side timber next above, so that the side timbers will meet and form a tight joint, and the ends of the ties shall be cut off smooth and even with the out side of the mole. The cribs so formed shall be filled with slate, soap stone, or other stone or gravel, and a bank shall be formed on the inner side, next the canal, of the usual slope, of good solid earth as in other cases. The moles so formed shall at each end be securely united with the bank of the canal. All of which shall be done agreeably to the directions of the engineer having charge of the work.

And it is mutually agreed that the said works, during their progress, shall be carefully examined and inspected, by the commissioners and the engineers in their employ, or either of them; and to prevent all disputes and misunderstandings, it is agreed that — or some other competent engineer, to be selected by said commissioners or one of them, shall be the inspector of said works, and shall estimate the number of cubic yards of excavation and embankment of each of the various descriptions herein specified, the number of perches of mason work in said lock and the number of piles, if any, in the foundation thereof, the number of perches of mason work and square feet of timber in any culvert or culverts to be erected under this agreement, and his estimate shall be final and conclusive between the parties to this contract. And the said part — of the first part further agree that during the progress of the work he will from time to time conform to such deviations from the present canal line or level, and to such alteration in the form, slope and dimensions of the banks, towing path, berm, extent and manner of grubbing and clearing, or any other of the works, as the commissioners or either of them, or any engineer in their employ, shall direct. And it is further agreed that if, in the opinion of the inspector aforesaid, the said part — of the first part shall refuse or unreasonably neglect to prosecute the work specified in this contract, such inspector shall have the power of determining that he has abandoned the contract, and such determination shall exonerate the commissioners from every obligation imposed upon them by this contract, and they may immediately thereafter proceed to dispose of the said section in the same manner as if this contract had never existed: and it is further agreed, that whenever this contract, in the opinion of the inspector aforesaid, shall have been completely performed, in every respect, on the part of the said part — of the first part, the said inspector shall certify the same in writing under his

band, together with his estimate of the amount of the various kinds of work herein specified, which shall have been done under this contract; and thereupon the said commissioners hereby covenant and agree to pay, within ten days after notice of said certificate and estimates, to the said part — of the first part, the sum which, according to this contract, shall be due, agreeably to said estimates of the engineer, at the following rates or prices, to wit: For the grubbing ——— for clearing and removing the vegetable substances, agreeably to the terms of this contract, ———, for earth excavation, estimated all earth necessarily excavated between and under the banks, including loose pieces of rock, or stones, of less than one fourth of a cubic yard each, (which are to be estimated as earth excavation,) ——— cents per cubic yard: for the excavation of all solid rock which may occur in this contract, ——— cents per cubic yard: for excavation of loose or detached pieces of rock or stones, (those only to be estimated under this item which are over one fourth of a cubic yard each,) at the rate of ——— cents per cubic yard: for each cubic yard of embankment necessarily made, (to be measured in the bank,) ——— cents: provided, that where any embankment is or can be formed in whole or in part from earth necessarily excavated in the construction of the adjoining parts of the canal, nothing shall be allowed for such embankment, or such part thereof as is, or can be so formed, unless the earth to form the same shall be necessarily removed over one hundred feet: for each perch of mason work (of $16\frac{1}{2}$ cubic feet) laid into the lock, agreeably to the plan furnished, or the direction of the commissioners or either of them, the resident engineer, or other engineer in the employ of said commissioners to be measured in the wall, the sum of ——— which price is understood to include the expense of the foundation, lock gates, timber and iron work connected with the lock, sheet piling, puddling and securing the head, sides and foundation of the lock, from the passage of the water around or under the lock; but does not include the expense of bearing piles for the foundation, if necessary, nor the excavation of the lock pit or embankment about the lock, which are to be estimated under their proper heads: for each pile driven into the foundation of a lock, by direction of the commissioners or engineers as aforesaid, (except sheet piling) ——— : for each perch (of $6\frac{1}{2}$ cubic feet) of mason work, in any culvert or culverts to be erected under this agreement, ——— and whenever the grubbing, clearing, excavation of any of the different kinds herein specified, embankment, or any other work to be done under this contract, shall be increased or diminished by conforming to any alteration of the line, level or plan of the work now made, agreeably to the direction of the commissioners or either of them, or any engineer in their employ, as herein before agreed, such increase or diminution of any or all the kinds of work herein specified, shall be estimated by said inspector agreeably to the foregoing rules, and the sum to be paid to the contractor shall be increased or diminished accordingly, agreeably to the rates and prices herein before specified: provided, however, and it is hereby expressly covenanted and agreed, on the part of the said part — of the first part, that this contract shall be fully performed and completed on — part by the — day of —

It is further understood that all payments made by the commissioners, under this contract, are to be by draft or check on — or other bank or agent of the commissioners of the canal fund, where, or with whom, deposits of money may from time to time be made for the construction of the canal.

In testimony whereof, we, have hereto set our hands, the day and year first above written.

[Signed triplicates hereof.]

H.

This schedule H. in the annual printed report, occupies above four pages of names of sundry persons, who subscribed various amounts, mostly in small sums; and many, in different kinds of property, and most of them with some conditions attached: in all, \$25,006—but from which will not probably be realized above one fourth part of that amount.

Nearly half was subscribed on the Cuyahoga and Tuscarawas line, north of New Philadelphia; and the other half at Chillicothe, and its neighborhood along the Scioto river. But its insertion, *in extenso*, has not been deemed necessary. Any individuals, however, wishing to see them, are referred to the Journal of the Ohio House of Representatives for 1825—6, pages 100—4; or the Journal of the Senate of the same year, pages 114—118.

ADDITIONAL REPORT OF THE CANAL FUND COMMISSIONERS.

22nd December, 1825.

TO THE GENERAL ASSEMBLY OF THE STATE OF OHIO,

In obedience to the duties enjoined by law, the commissioners of the canal fund respectfully submit the following statement of the particular application of money expended since last February, in the construction of the Ohio canals.

There has been paid to contractors on the northern section, as per abstract, furnished by A. Kelley, Esq. acting commissioner, \$63,279 00

On Licking summit, for same, by M. T. Williams, acting commissioner, 23,583 00

On the Miami canal, do. per do. 31,994 00

118,856 00

For contingencies on the northern section, by A. Kelley,

4,120 00

Do. on Licking summit and Miami canal, by M. T. Williams,

4,692 87½

In addition to the above, there has been paid to the canal commissioners, of the appropriation of February last, and expended in payments for contingencies,

3,000 00

11,812 87½

\$130,668 87½

Funds have been furnished to meet the above expenditures, under different requisitions of the board of canal commissioners, viz:

The appropriation of the 3d of February last, paid to that board on the 7th of the same month, \$3,000 00

Appropriation of the 4th of February last, of \$40,000. as follows:

June 9th Order in favor of the

W. R. Bank, \$15,000 00

Deduct expense charged by the bank for collection, 20 00

14,980 00

Same date, order in favor of the Lancaster

Ohio Bank, 15,000 00

July 5th. do. do. Franklin Bank of Columbus, 10,000 00

42,980 00

\$42,980 00

Amount brought forward,

In addition to the foregoing, bills have been drawn on the Manhattan Bank, as follows, viz:

No. 1, Aug. 5, payable 120 days after date,	in favor of the	W. Reserve Bank,	\$5,000 00
do. 2, & 3, Sept. 1,	do.	Lancaster Bank, each \$10,000 00	20,000 00
do. 4, & 5, do. 1,	do.	do. each 10,000 00,	20,000 00
do. 6, do. 1,	do.	Bank of Columbus,	10,000 00
do. 7, do. 1,	do.	Western Reserve Bank,	25,000 00
do. 8, Oct. 1,	do.	Lancaster Bank,	10,000 00
do. 9, do. 1,	do.	do.	10,000 00
do. 10, do. 1,	do.	Western Reserve Bank,	40,000 00
do. 11, do. 1,	do.	Lancaster Bank	1,000 00
			<hr/>
			141,000 00
			<hr/>
			183,980 00
			<hr/>
			130,668 87½
			<hr/>

Deduct for pay, labor, and contingencies, as above

Leaves an unexpended balance, as follows:

In the Western Reserve Bank, applicable to payments on contracts,	\$36,701 00
do. do. to payment of contingent expenses	880 00
In the Lancaster Bank, applicable to payments on contracts,	15,423 00
In the Columbus Bank, applicable to payment of contingent expenses,	307 13
<hr/>	
53,311 00	
<hr/>	

Contingent expense incurred from 1st of February to the 1st of December, for engineers, acting commissioners and assistants, per abstract of M. T. Williams, acting commissioner, \$4,494 90

Same for provisions, out fits and incidental expenses, 2,631 02

Contingent expenses from 1st of February to the 1st of December, per abstract of A. Kelley, acting commissioner, 3,888 56

Same, for provisions and incidental expenses, 2,221 17

\$13,285 00

Of this sum a part remained unpaid on the 1st of December, when the account was made out.

There has been placed in the Bank of Lancaster, subject to the order of the President of the board, to defray the personal expenses of the canal commissioners, \$1,000 00

Of this sum there has been paid,

Dec. 14th, to N. Beasley, \$70 37½

Do. T. Worthington, 57 80

Do. J. Johnston, 89 75

Do. B Tappan, 45 00

262 92

Leaving an unexpended balance of

737 08

These statements, except the last, are supported by abstracts of payments, furnished by the acting commissioners, with satisfactory vouchers, carefully compared by the board of canal commissioners. We had also intended an additional check, to test the correctness of the abstracts, by comparing them with the statements of the payments made at Bank, vouched by the orders of the acting commissioners in favor of contractors. We have not yet been able to get our accounts from the banks so stated, as to give every desirable facility to the accomplishment of this object; but we entertain no doubt that the fund has been faithfully applied.

An account of the personal and other necessary expenses, incurred by the Commissioners of the Canal Fund, up to the first of this month, amounting to \$591 30, not yet drawn, is herewith submitted.

Since our last report, we have been furnished with a list of conditional donations to the canal fund, consisting of land and of bonds payable at a future date. These substantial evidences of public spirit, far exceed the estimate in our former report; they amount to more than thirty thousand dollars; and may be considered a valuable auxiliary to defray interest or contingencies. As there is no provision made by law, for disposing of land thus bestowed, we respectfully recommend the appointment of an agent, vested with authority to receive the titles, and to sell and make conveyances under such prescribed regulations, as security and the interest of the fund requires.

The act constituting this board, has intrusted to the commissioners the highly responsible charge of so directing the paying out and accounting for money, as will best secure a faithful application of the fund. The system adopted, was explained in their former communication; and the present, contains a detail of their operations under it. The whole will enable the Legislature to judge how far the commissioners have judiciously exercised the management confided to their discretion.

The commissioners avail themselves of this opportunity to correct an accidental error in a date, in their last report. The principal of the loan is redeemable on the 31st of December. 1850.

Respectfully submitted,

December 22, 1825.

ETHAN A. BROWN,
E. BUCKINGHAM, jun.
ALLEN TRIMBLE.

REPORT,

Of the committee of the Senate of Ohio, "to whom were referred the report and accompanying documents of the Canal Fund Commissioners, made report, which was taken up and read as follows, to wit:"

[See Journal of Senate 1825-6, page 148 to 150.]

The committee to whom was referred the report of the Commissioners of the Canal Fund, of December 22. respectfully report:—That from a careful examination and comparison of the different abstracts of payments, made upon contracts, and for contingencies and incidental expenses, there appears to have been drawn from the Canal Fund the following sums, viz:

Upon the order of A. Kelley, acting commissioner, for the payment of contracts	\$ 63,279 00
Upon the order of M. T. Williams, for the same	55,577 00
Upon the orders of A. Kelley and M. T. Williams, for contingencies and incidental expenses	11,832 87
Amounting in all to	<u>\$130,688 87</u>

There has been drawn from the Treasury the amount of two appropriations of the last session

And from the Manhattan Bank, of the loan negotiated in April, under the law of last session	\$43,000 00
	141,000 00
	<u>184,000 00</u>
From which deduct the amount actually paid out, as above	130 688 87

And there remains a balance of

now deposited in the Western Reserve Bank, and the Banks of Columbus and Lancaster, subject to the order of the acting commissioners, for the payment of contracts and contingencies; to which add the balance of the loan not yet drawn	\$53,311 13
Leaves of the present fund unexpended	\$302,311 13
From which deduct the interest that will have accrued upon the loan, on the first day of January next	917 61

And the sum applicable to the payment of contracts and contingencies, for the ensuing year, will be

301,393 52

Under the head of contingencies and incidental expenses, is included the salaries and per diem compensation of the acting commissioners, principal and assistant engineers, and the hands employed by them, outfits, provisions, and personal expenses; all of which are evidenced by the abstracts and vouchers furnished by the acting commissioners to the Board of canal commissioners; and after having been subject to the inspection and examination of that Board, are passed to, and charged in the account of the Fund Commissioners. This mode of accounting for contingencies, from the nature of the

explanation, is perhaps the only one that can be adopted; the great variety of charges, and the inconsiderable amount of the most of them, would seem to render it extremely difficult, if not altogether impossible, in many cases, to accompany each charge with a receipt of payment from the person to whom it was due. Much must necessarily be left to the integrity and accuracy of those employed in the expenditure. The regularly accounting for those sums particularly applicable to the payment of contracts, is not subject to the same difficulties and embarrassments, and the mode adopted by the commissioners of the Canal Fund, is, in the opinion of your committee, well calculated to produce perfect accuracy and harmony in the accounts, affording in itself all the necessary security for a faithful application of the fund. A deposit is in the first place made by the commissioners of the Canal Fund, upon the requisition of the Board of canal commissioners, and made subject to the order of an acting commissioner, under these restrictions, that no payment be made upon the check or draft of an acting commissioner, unless it is specified upon what contract to be applied; a copy of which is required to be furnished, and accompanied by the certificate of a resident engineer, that labor to the amount drawn for has been performed. By this arrangement no money goes into the hands of the acting commissioners, nor can any be drawn for by them until labor to the amount has been actually performed, or materials furnished; and the several accounts of the acting commissioners, the commissioners of the Fund, and the banks through which the business is transacted, by operating as checks upon each other, furnish every necessary means for the detection of error and the prevention of fraud. The committee also have had under consideration the accounts of the commissioners of the Canal Fund, for personal expenses incurred in negotiating the loan of April last, and are of opinion that the same are reasonable, and ought to be allowed. They farther recommend, that an additional allowance be made, as a compensation for their time employed in the service of the state. It is also worthy of consideration, whether provision ought not to be made, by law, for the payment of a reasonable compensation for services, hereafter to be performed by the commissioners of the Canal Fund; your committee, therefore, recommend the adoption of the following resolutions:

Resolved, by the General Assembly of the state of Ohio, That the plan adopted by the commissioners of the Canal Fund, for the disbursement and accounting for the fund under their control, is well calculated to secure a faithful application and prudent expenditure thereof.

Resolved, That the commissioners of the Canal Fund be, and they are hereby authorised to draw from the Canal Fund the sum of four hundred and ninety-one dollars and thirty cents, in full of their accounts for expenses, and, also, the sum of ——— dollars, as a compensation, hereby allowed them for services rendered, and charge the sum to the account of the expenditure of said fund.

Resolved, further, That the joint committee on canals be instructed to report a bill, fixing a per diem compensation for the commissioners of the Canal Fund, for their expenses hereafter incurred, and services rendered, in discharge of the duties required of them by law.

Extract from the Journals of the Senate, of the 27th Dec. 1825.

The Speaker presented to the Senate his resignation of the appointment of Commissioner of the Canal Fund, in writing; which was taken up and read as follows, to wit:

TO THE GENERAL ASSEMBLY OF THE STATE OF OHIO:

I herewith tender my resignation of the appointment of Commissioner of the Canal Fund. I consider it due, as well to those who maintained my

right to a seat in the Senate as to myself to say that it is not from any doubts, existing in my own mind, as to the constitutionality of a Commissioner of the Canal Fund occupying a seat in the General Assembly, that I have come to the determination to resign my appointment at this period.

I am fully convinced that holding both situations is not incompatible with the constitution. In this opinion I am supported by a large majority of my constituents, by a unanimous decision of a numerous committee selected by the Senate to investigate the subject, by a majority of the Senate and also, by the opinion of some of the most able jurists of this or any other country.

I am, however, unwilling to hold a seat in the Senate of Ohio, and particularly the station of its presiding officer, when a part of its members, respectable for numbers and information, believe me disqualified by holding the appointment of Commissioner of the Canal Fund. The confidence so liberally bestowed upon me, on all occasions, by the Senate, (which appears from the late vote for Speaker, not to be diminished,) seems also to require that I should relieve them and myself from all embarrassments that may grow out of the investigation of questions connected with this subject, and, as far as in my power, remove every obstacle to a harmonious discharge of our public duties. Thus impressed, and believing it would be inconsistent with the duties and obligations imposed on me by receiving the suffrages of the district which I have the honor to represent, to abandon the station in which those suffrages have placed me; I take the other alternative, in the confident hope that no inconvenience will result from my resignation.

I have the honor to be,
with great respect,
your most obedient,

ALLEN TRIMBLE.

Columbus, December 26, 1825.

AN ACT

Supplementary to the act, entitled "An act, to provide for the Internal Improvement of the state of Ohio, by navigable canals."

Sec. 1. *Be it enacted by the General Assembly of the state of Ohio, That the commissioners of the canal fund, be, and they are hereby, authorized to borrow on the credit of this state, any sum not exceeding four hundred thousand dollars, in the year one thousand eight hundred and twenty-six; and a sum not exceeding six hundred thousand dollars, in the year one thousand eight hundred and twenty-seven; and a sum not exceeding six hundred thousand dollars, in the year one thousand eight hundred and twenty-eight; in addition to the sum of six hundred thousand dollars annually, which is authorized by the provisions of the act to which this is a supplement, at a rate of interest, not exceeding six per cent. per annum, for which the said commissioners shall issue transferable certificates of stock; and the moneys which shall be borrowed, in pursuance of this section, shall be deemed, and taken as part and parcel of the moneys which are authorized to be borrowed by the act to which this is a supplement; and all the provisions thereof shall be understood and construed to extend to the moneys which shall be borrowed, in pursuance of the authority hereby vested in said commissioners, as effectually to all intents and purposes as if the same had been expressly named and authorized by said act.*

Sec. 2. *That said commissioners are hereby authorized, in behalf of this state, to borrow of any individual or individuals, or body corporate, in this state, or elsewhere, in the year eighteen hundred and twenty-six, any sum*

of money not exceeding five hundred thousand dollars, on such terms as they may deem expedient, at a rate of interest not exceeding six per cent. per annum; which said moneys, so to be borrowed, shall be repaid by said commissioners, with the first moneys they may obtain on any regular loans made in pursuance of this act, or the act to which this is a supplement.

Sec. 3. That all moneys obtained by said commissioners, by virtue of this act, shall be by them paid out and expended, agreeably to the provisions of the act to which this is a supplement.

WM. W. IRVIN,
Speaker of the House of Representatives.
ALLEN TRIMBLE

Speaker of the Senate.

January 18, 1826.

AN ACT

For the protection of the Ohio Canals.

Sec. 1. *Be it enacted by the General Assembly of the state of Ohio,* That every person who shall lead, drive or ride any horse, ox or ass, mule or other animal, upon the towing path, or the bank opposite to the towing path, of any canal, authorized by the laws of this state, except for the purpose of towing boats or other floating things upon the waters thereof; and except for the purpose of conveying articles to and from the said canals, in order to their transportation on the waters of the same, or their delivery at their place of destination; shall forfeit for every such offence, the sum of five dollars, and pay all damages consequent upon such offence over and above the said forfeiture.

Sec. 2. That if any boat or other floating thing, shall be so moored in any of the canals as to obstruct the navigation thereof, or if any person or persons shall obstruct the navigation of any of the said canals, by means of the loading, unloading, misplacing or otherwise misconducting any boat or other floating thing; and shall not immediately, upon being required thereto by any commissioner, engineer, superintendent or agent, employed on said canals, or by any person incommoded by such obstruction, remove the same; the boatman or person who caused said obstruction, shall forfeit for every such offence the sum of twenty-five dollars over and above the expense of removing said obstruction.

Sec. 3. That if any person or persons shall obstruct the navigation of either of said canals by sinking any vessel, timber, stone, earth or other thing or things to the bottom of either of said canals, or by placing any obstruction on the towing path thereof, or on the bank opposite the towing path thereof; such person or persons shall forfeit for every such offence, the sum of twenty-five dollars, over and above the expense of removing said obstruction.

Sec. 4. That if any person or persons shall wantonly or unnecessarily open or shut, or cause to be opened or shut, any lock, gate or any paddle or culvert gate thereof; or any waste gate, or drive any nails, spikes, pins or wedges into either of said gates, or take any other mode of preventing the perfect and free use of either of said gates, or shall wantonly or maliciously break, throw down or destroy any bridge on either of the said canals; such person or persons shall, for every such offence, forfeit the sum of fifty dollars, and pay all damages consequent upon such offence, over and above the said forfeiture.

Sec. 5. That all materials that shall have been procured by any contractor for the construction of any part of said canals, or of any works there-with connected, shall, from the time they are prepared for transportation to

the place where they are to be used, be subject to the lien of the state, for all moneys that may have been, or shall be, advanced by the state, during the performance of said contract, and for all damages that may be sustained in consequence of the nonperformance thereof; and no sale by the said contractor, or under an execution, issued upon any judgment or decree shall in any wise affect said lien.

Sec. 6. That if any person or persons shall wilfully and maliciously break, throw down or destroy any lock, bank, waste weir, aqueduct or culvert belonging to any canal, authorized by the laws of this state; such person or persons shall, for every such offence, be deemed guilty of a misdemeanor, and on conviction thereof, before the court of common pleas of the proper county, be sentenced to imprisonment in the penitentiary, at hard labor, for any time not less than three, nor more than seven years, at the discretion of the court; and shall moreover be liable to pay all damages sustained in consequence of such offence.

Sec. 7. That no person shall construct any wharf, basin or watering place on, or make or apply any device whatever for the purpose of taking water from either of the said canals without first obtaining permission therefor of one of the acting commissioners, or of the principal engineer of the canal, where such wharf, basin, watering place, or device, as aforesaid, is desired, in writing, and if any person shall offend against this section by attempting to make any such construction or apply such device without such permission, or shall not conform to the directions of the acting commissioner or engineer, who may give such permission in respect to the location and size of such wharf, basin, watering place or device as aforesaid; such person shall, for every such offence, forfeit the sum of twenty-five dollars; and the said acting commissioner or engineer shall be authorized, at the expense of the person thus attempting to remove and destroy every such wharf, basin, watering place or device as aforesaid.

Sec. 8. That in all cases in which it shall be deemed necessary by the principal engineer or acting canal commissioner, in laying out the line of any canal authorized by the laws of this state, or any work connected therewith, to discontinue and alter any public road or highway; such engineer or acting canal commissioner shall be authorized to make such discontinuance or alteration, and upon his drawing up a plat, with a true description, in writing and figures, of all such parts of any public road or highway, as he may discontinue or new lay, on the account aforesaid, and filing the same in the office of the county auditor of the county in which such discontinuance and alteration may be situated; the same shall be lawful, and the new laid road, as described in said plat, shall be deemed a public highway, of the same width that such road so discontinued or altered, was, and shall be entered on the record of roads, by the county auditor as such: *Provided however,* That the canal commissioners shall, before they obstruct the passage on any part of a highway, now legally established, open and reasonably work in order to render it passible, such part of said highway as may be new laid by said engineer or acting canal commissioner, as aforesaid, and the certificate of said engineer or acting canal commissioner, in writing, that the part of any highway, new laid as aforesaid, is opened, and reasonably worked as aforesaid, by said canal commissioner, shall be sufficient for their justification; and that every alteration, heretofore made by any engineer or acting canal commissioner, in any public road or highway, on either of the said canals, shall from the time of such alteration, be deemed lawful to all intents and purposes.

Sec. 9. That in all cases when a new road or public highway is laid out by legal authority, in such direction as to cross the line of any canal or navigable feeder, authorized by the laws of this state, after the line of such canal

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY, BY JOHN KILBOURN, AT \$3 A YEAR, IN ADVANCE.

VOL. I. COLUMBUS, OHIO, SATURDAY, SEPT. 27, 1828.

NO. 15

Readers will notice that the Ohio Canal documents are continued on the third page of every number, from the last page of the preceding number.

The insertion *in extenso* of the communication of Aden Trimble, esq. to the Senate, resigning his place as a Canal Fund Commissioner, inserted in the last number, pages 221 and 222, when a short sentence would have announced the fact, may seem superfluous.

But, when we consider that legislative bodies, as well as courts of justice, are considerably swayed, in doubtful cases, by precedents, it was deemed proper to present the circumstances of the case, as exhibited in said communication; so as to be conveniently accessible, for reference, in future years.

He seemed to have resigned his place as Fund Commissioner, on the ground of expediency; as considerable numbers of people were dissatisfied with his holding that station and that of a legislator.—And, as nearly all legislation is based upon expediency, it is considered that Mr. Trimble acted wisely, in resigning one of the places, which he then held.

By the survey of the Boston and Hudson R. R. Road, it will pass through Berkshire, Mass. at an elevation of 1,440 feet above the Connecticut, and 1,477 above the Hudson. The friends of the work are sanguine of success.
Eastern paper.

SPRINGFIELD, Sept. 17.

Schools.—At our annual town meeting, last spring, the following sums were appropriated to the purpose of public instruction, viz:

For common schools,	\$2,500
For finishing high school building,	750
Towards salary of master for high school,	500

\$3,750

Add annual proceeds of school fund, divided among the district schools,	500
---	-----

Gives the generous total of \$4,250

Of this sum \$3,500 are paid out to school masters and school mistresses.—*Journal.*

Hampshire and Hampden Canal.—It is expected that the whole line of this canal, from New Haven to Westfield, will be completed the present Fall. "Six well built and superior boats are now in readiness waiting the event." The work north of Westfield will probably not be completed until another season.—*Hamp. S.*

[From the Salem Gazette of Sept. 19.]

Anniversary of the Settlement of Salem.

The bi-centennial anniversary of the landing of the Pilgrims at Naumkeag was yesterday celebrated in this town with appropriate ceremonies. It was indeed a day of happiness and festivity. The weather was propitious, the novelty of the celebration (unprecedented in the "Bay State,") the high and distinguished character of the orator, the gravity of his theme, the unusual assemblage of eminent and distinguished men from this and neighboring and even from distant places, and the immense multitude that thronged to hear the oration, created the deepest interest. The highest expectations were gratified. The discourse, by Hon. Judge Story, was of the highest order of excellence—for the space of more than two hours he delighted and gratified a crowded auditory with a most able profound, and eloquent discussion of the topics appropriate to the day, and all regretted that it closed so soon. To use the words of Cotton Mather, "the design whereon, the manner wherein, and the people whereby" this ancient colony was settled, could not have been more ably, eloquently, and adequately commemorated.

In the course of the exercises at Church, the following hymns were sung; the first written by President Adams, in 1802; the other by the Rev. Dr. Flint, of this town, for the occasion:

BY PRESIDENT ADAMS.

When o'er the billows, heaving deep,
The fathers of our race
The precepts of their God to keep,
Sought here their resting place,

The gracious God their heart prepared,
Preserved from every harm,
And still for their protection bared
His everlasting arm.

His breath, inspiring every gale,
Impels them on the main,
His guardian angel spread their sails,
And tempests howl in vain.

For them old ocean's rocks are smooth'd,
December's face grows mild,
To vernal airs her blasts are sooth'd,
And all her rage benign'd.

When famine rolls her haggard eyes,
His ever bounteous hand
Abundance from the sea supplies,
And treasures from the sand.

Nor yet his tender mercies cease,
His overruling plan
Inclines to gentleness and peace
The heart of SAVAGE MAN!

And can our stony bosoms be
To all these wonders blind?
Nor swell with thankfulness to Thee,
On! Parent of mankind?

All-gracious God! inflame our zeal,
Dispense one blessing more;
Grant us thy bounteous love to feel,
Thy goodness to adore.

By REV. DR. FLINT.

In pleasant lands have fall'n the lines
That bound our goodly heritage,
And safe beneath our sheltering vines
Our youth is blest, and sooth'd our age.

What thanks, O God, to Thee are due,
That Thou didst plant our fathers here,
And watch and guard them as they grew;
A vineyard, to the planter dear.

From them, a pure and chosen seed,
Have sprung a people great and free;
Who ever in their hour of need
Have found a present help in Thee.

With pious steps we love to trace
And mark the spot, as holy ground,
Where first a rest and dwelling place
The weary band of pilgrims found.

Where we sleep safe, they watch'd with fear;
And pu'd in famine, where we feast;
They heard, where we sweet minstrels hear,
The savage howl and prowling beast.

The toils they bore, our ease have wrought;
They sow'd in tears, in joy we reap;
The birthright they so dearly bought
We'll guard 'till we with them shall sleep.

Thy kindness to our fathers shown,
In weal and wo through all the past,
Their grateful sons, O God, shall own,
While here their name and race shall last.

*Extract from Hon. Edward Everett's Address
on the occasion.*

"But, while on this happy occasion we contemplate, with mingled feelings of pride and joy, the lovely and august form of our America, rising, as it were, from the waves of the ocean, with the grace of youth in all her steps and the heaven of liberty in her eye, there is another aspect under which we are led, by natural association to regard her, as we consider the family of republics, which have sprung into being beyond the mountains. The graceful and lovely daughter has become the mother of rising states. While our thoughts on this day, are carried back to the tombs of our fathers beyond the sea, there are millions of kindred Americans beyond the rivers and mountains whose hearts are fixed on the Atlantic coast, as the cradle of their political existence. If the states of the coast were struck from existence, they would already have performed their share of the great duty, as it has been called, of social transmission. [Great applause.] A mighty wilderness has been colonized, almost within our own day, by the young men of the Atlantic coast: not

driven by the arm of persecution from the land of their birth, but parting, with tearful eyes from their pleasant homes, to follow the guiding hand of Providence to the Western realm of romance.

It is just forty years this summer, since a long awkward looking wagon was seen traversing the roads and winding through the villages of Essex and Middlesex, covered with a black canvass, inscribed on the outside, in large letters, "to Marietta on the Ohio." That expedition, under Dr. Cutler, of this neighborhood, was the first germ of the settlement of Ohio, which now contains near a million of inhabitants. [Cheers.] Forty years have scarce passed by, and this great state, with all its settlements, improvements, its mighty canals and growing population, was covered up, if I may so say, under the canvass of Dr Cutler's wagon. Not half a century, and a state is in existence, (twice as large as our old Massachusetts,) to whom not Old England, but New England, is the land of ancestral recollection.

Yes, Sir, on richer soils and broader plains than ours, there are large communities of men, to whom our rocks and our sands will be forever dear. Ten years ago there were thirteen or fourteen settlements west of the Alleghanies, bearing the name of Salem, the city of peace; One in Kentucky, one in Indiana, eight or nine in Ohio, all bearing the name of the spot, where we are assembled, where the fathers of Massachusetts first set foot two hundred years ago.

Sir, there is much in the fortune of these our sister states to fix our attention and sympathy. In reading their recent history, we seem to be reading our early annals. Struggles with the Indians and the Spanish enemy, at the South, recal to us the conflicts of our fathers with the French and the Savages of the Canadian frontier. In travelling westward, a few hundred miles in point of space, we seem to have travelled backward two hundred years, in point of time, although we cannot but congratulate our brethren in that region, that, under the cheerful auspices of the Confederacy, they have made a greater progress in fifty years, than the settlements of the Atlantic Coast were able to make, in three times that period.

It is an incident which deserves mention, in this connection, that the first comprehensive history of the whole of that wonderful region, the valley of the Mississippi, in all its parts, has lately been given to the world, by a son of Massachusetts, a kinsman of my worthy friend over the way, (Rev. Mr. Flint,) and dedicated, with great propriety, to an esteemed citizen of Salem (Joseph Peabody, Esq.) who shares the festivities of this occasion. This incident is but one among the numerous illustrations of the manifold nature of the ties which connect the different parts of the Union: which, beginning in kindred blood, are destined, I believe, to be fortified by all the bonds of social intercourse, harmony and good will. Without further trespassing on the indulgence of the company, I will ask permission, Mr. President, to propose the following sentiment:

The Western States—Plenty in their broad fields; property on their noble waves; and brotherly love between them and us.

or feeder is permanently located and established; and in such manner as to require the erection of a new bridge over such canal or feeder for the accommodation of said road; such bridge shall be constructed and forever maintained at the expense of the county in which such bridge is situated: *Provided however*, That no bridge shall be constructed across either of said canals or navigable feeders, without first obtaining for the model and location thereof, the consent, in writing, of one of the acting canal commissioners, or the principal engineer of the canal to be intersected by said road: and if any person or persons shall undertake to construct or locate said bridge, without such consent, and shall proceed therein so far as to place any materials for that purpose on either bank of the canal, or on the bottom thereof, he or they shall be subject to a penalty of fifty dollars for such undertaking, and either of said commissioners or engineers shall be authorized to remove all such materials so soon as they are discovered, wholly without the banks of the canal.

Sec. 10. That for all damages done to either of the said canals, or any work connected therewith, either of the acting commissioners or resident engineer shall be authorized to sue the offender or offenders in the name of the state of Ohio, in any court of competent jurisdiction; and if a verdict or judgment shall be given against any person or persons for such damages, the plaintiff shall recover the same, with full costs of suit; and in all cases in which suits are brought, it shall be the duty of the canal commissioners to have accurate accounts kept of the amount of recoveries, and of costs and expenses; and after deducting the said costs and expenses from said amount to pay the residue of said recoveries over to the state treasurer, subject to the order of the commissioners of the canal fund.

Sec. 11. That all penalties and forfeitures created by this act, the recovery of which is not otherwise herein provided for, may be sued for and recovered before any justice of the peace in any county where such penalty or forfeiture shall accrue in the name of the state of Ohio, by either of the canal commissioners, resident engineers, or any collector of toll, duly appointed by said commissioners, and the amount of such penalties and forfeitures, when recovered, shall be paid over to the treasurer of state, subject to the order of the commissioners of the canal fund.

Sec. 12. That it shall be the duty of either of the acting canal commissioners, on application being made to him for the assessment of damages for any lands, waters, streams or materials, deemed necessary, taken and appropriated for the prosecution of the improvements intended and authorized by virtue of the act, entitled "An act, to provide for the internal improvement of the state of Ohio by navigable canals;" to appoint appraisers for the assessment of such damages, and to pay the same agreeably to the provisions of the eighth section of said act, any thing therein to the contrary notwithstanding.

WM. W. IRVIN,

Speaker of the House of Representatives.

ALLEN TRIMBLE,

Speaker of the Senate.

January 31, 1826.

AN ACT

To provide for the appointment of Commissioners of the Canal Fund.

Sec. 1. *Be it enacted by the General Assembly of the state of Ohio, That Simon Perkins, of the county of Trumbull, be, and he is hereby, appointed a commissioner of the canal fund, to fill the vacancy occasioned by the resignation of Allen Trimble; and the said Simon Perkins is hereby vested with*

the same powers, and required to perform the same duties that are vested in and required of the other commissioners of the canal fund, and shall hold his office for the same period that the said Allen Trimble would have done, if he had not resigned his said office.

Sec. 2. That all appointments of commissioners of the canal fund, hereafter to be made, except appointments made in the recess of the Legislature, shall be by law.

This act to take effect and be in force from and after the passage thereof.

WM. W. IRVIN,
Speaker of the House of Representatives.
ALLEN TRIMBLE,
Speaker of the Senate.

February 7, 1826.

AN ACT

To provide for the increase of the Canal Fund by the purchase and sale of real estate.

Sec. 1. *Be it enacted by the General Assembly of the state of Ohio,* That the canal commissioners be, and they are hereby, authorized to procure, by purchase or otherwise, a suitable number of acres of land, at each and every point on or adjoining the Ohio canals, heretofore authorized to be constructed where the surplus water passing through said canals may be profitably used for hydraulic purposes: *Provided,* That no contract entered into under the provisions of this section, shall be binding on the state until such contract shall have been submitted to the Governor, and his approval endorsed thereon: *And provided,* That the said commissioners shall not expend by virtue of the powers hereby vested in them, a sum exceeding twenty thousand dollars.

Sec. 2. That the canal commissioners are hereby, authorized and empowered to sell all such lands and town lots, as have heretofore been, or may hereafter be given, granted or ceded to the state for the benefit of the canal fund, other than those which are situated at points or places on or adjoining the line of the Ohio canals, where the surplus water produced by said canals, can be advantageously used for hydraulic purposes; and on the receipt of the payment in full of the purchase money, it shall be the duty of the commissioner making the sale of such lands or town lots, to forward to the Executive office a certified plat and survey of such lands or town lots, containing a pertinent description thereof, together with a certificate that payment has been made in full, according to the terms of the sale, stating therein the amount thereof, and that the purchaser is entitled to a deed of the lands or town lots therein described; which plat and certificate shall be filed and preserved in the office of the secretary of state.

Sec. 3. That all moneys arising under the provisions of this act shall be received by the canal commissioners, and by them paid over to the treasurer of state, for the benefit of the canal fund; and made subject to the order of the commissioners of the canal fund; and it shall be the duty of the treasurer to keep separate accounts of all moneys so received, and to report half yearly, on the first Mondays of January and July, to the commissioners of the canal fund, the amount thereof remaining in the treasury subject to their order; and shall also report to the Legislature, annually, on the first Monday of December, the amount of said fund that shall have accrued during the year ending on said first Monday of December, and how disposed of, together with such other information as he may think necessary, relating thereto.

Sec. 4. That all conveyances of lands and town lots given, granted or ceded to the state, or purchased by the canal commissioners in aid of, and for the benefit of the canal fund, shall be made to the state of Ohio, and be, by the canal commissioners, deposited in the office of the secretary of state; and all conveyances of lands and town lots, sold by the canal commissioners, under the provisions of this act, shall be made in the name of the state of Ohio, signed by the Governor, and countersigned by the secretary of state.

Sec. 5. That for the purpose of carrying into effect the provisions of this act, the canal commissioners shall have power to appoint one or more agent or agents, who shall be a member or members of said board; and the acts of the said agent or agents, performed by virtue of their appointment, shall have the same force and effect, as if performed by the canal commissioners.

WM. W. IRVIN,

Speaker of the House of Representatives.

ALLEN TRIMBLE,

Speaker of the Senate.

February 7, 1826.



AN ACT

In addition to the act, entitled "An act supplementary to the act, entitled 'An act to provide for the Internal Improvement of the state of Ohio by navigable canals.'"

Sec. 1. *Be it enacted by the General Assembly of the state of Ohio,* That instead of the sum of five hundred thousand dollars which the commissioners of the canal fund are authorized to borrow, by virtue of the second section of the act to which this is in addition, the said commissioners are hereby authorized, on behalf of this state, to borrow of any individual or individuals, or body corporate in this state or elsewhere, in the year one thousand eight hundred and twenty-six, any sum not exceeding six hundred thousand dollars, for any time not exceeding two years, at such interest as they may deem expedient; which said moneys, so to be borrowed, shall be repaid by said commissioners with the first moneys which they may obtain on any regular loan made in pursuance of the laws of this state.

Sec. 2. That the second section of the act to which this is an addition, be, and the same is hereby, repealed.

WM. W. IRVIN,

Speaker of the House of Representatives.

ALLEN TRIMBLE,

Speaker of the Senate.

February 8, 1826.



AN ACT

To provide for the preservation of the papers and documents relating to the Ohio Canals.

Sec. 1. *Be it enacted by the General Assembly of the state of Ohio,* That it shall be the duty of the canal commissioners, as soon after the passage of this act as practicable, to deposite in the office of the Auditor of state, certified copies of all their proceedings of which they have kept a record; and also an abstract of all accounts of the receipt and expenditure of the canal fund, accompanied with the original or duplicate receipts of such expenditure, as far as the same may be within their power, and they shall hereafter report quarterly to the Auditor of state, on the first day of March, June,

September and December, or as soon thereafter as may be practicable, a full and correct statement or account of all receipts and disbursements of the canal fund, for the quarter ending on either of said days accompanying each charge against said fund with a duplicate receipt of payment, stating in such account the amount placed subject to the order of each of the acting canal commissioners, applicable to the payment of contracts and contingencies for such quarter, and the amount of contracts for the construction of the canals authorized by the laws of this state, and of the works therewith connected, which shall have been made by either of the acting canal commissioners, during such quarter.

Sec. 2. That it shall be the duty of the commissioners of the canal fund, as soon after the passage of this act as practicable, to deposite in the office of the Auditor of State, certified copies of all papers and documents relating to the canal fund, that in their opinion may be necessary to furnish the requisite information of the state and condition of that fund: and a correct statement of the whole amount of said fund, derived from loans and appropriations; and the places where the same is deposited, and to whose order subject; and it is hereby made their duty hereafter to report to the Auditor of State, quarterly, on the first day of March, June, September and December, or as soon thereafter as may be practicable, the amount of loans effected, received from appropriations and other sources where deposited, to whose order made subject, whether for the payment of contracts or contingencies, and the whole amount of interest, if any, that will fall due during the quarter ending on either of said days; and also furnish a statement of the expenditure of said fund during such quarter, accompanied with certified copies of receipts for all disbursements therein stated, and in their report for the quarter ending on the first day of December, they shall also state the probable amount of interest that will be required for the ensuing year; and the said commissioners of the canal fund and the canal commissioners shall, each deposite in the office of the Auditor of State, all such other papers and documents relating to the construction of said canals, and the receipts and expenditure of the funds appropriated for that purpose, as in their opinions may be necessary to furnish all needful information upon those subjects, and all other subjects therewith connected.

Sec. 3. That it shall be the duty of the Auditor of State, to record in suitable books, to be by him provided for that purpose; all reports, statements and accounts made to him or deposited in his office by the canal commissioners, and the commissioners of the canal fund, relating to the receipts and expenditure of said fund, and the construction of said works; and to carefully file and preserve in his office, all papers, documents and vouchers, that shall be deposited with him, under the provisions of this act.

WM. W. IRVIN,

Speaker of the House of Representatives.

ALLEN TRIMBLE,

Speaker of the Senate.

February 8, 1826.

AN ACT

Fixing the compensation of the Acting Canal Commissioners, and for other purposes.

Sec. 1. *Be it enacted by the General Assembly of the state of Ohio. That the acting canal commissioners, shall, each, hereafter receive the sum of three dollars per day, for each and every day by either of them actually em-*

ployed in the discharge of the duties required of them by law; which compensation shall be in full for the services by them rendered, and for their travelling and personal expenses, any law or usage to the contrary notwithstanding.

Sec. 2. That in case either of the canal commissioners, or commissioners of the canal fund shall hereafter be elected to a seat in either branch of the Legislature, such election shall render his appointment, as a member of either of said boards of commissioners, absolutely void, from the time of such election, and his seat therein vacant; and the same shall be filled as other vacancies are by law required to be filled.

WM. W. IRVIN,

Speaker of the House of Representatives.

ALLEN TRIMBLE,

Speaker of the Senate.

February 8, 1826.

Resolved by the General Assembly of the state of Ohio, That the Board of canal commissioners, be, and they are hereby authorized, when convenience will permit, to make an examination so far as to ascertain the probable supply of water for a canal, from the mouth of Little Beaver creek, on the Ohio river, in this state, to a point on the Ohio canal, at the mouth of Sandy creek, near Fort Lawrence, and make report of such examination to a future session of the Legislature: Provided, That said examination shall not be made to the prejudice of the works, in which the state is now engaged.

January 30, 1826.

Extracts from Governor Morrow's message, of the 6th of Dec. 1826.

The progress made in the work on the lines of canal, is such as to fulfil the just expectations of the General Assembly, and from personal observation, and other sources of information, I am enabled to express the opinion, that the work has been executed in a manner best calculated to answer the purposes for which it was intended. The masonry is composed of excellent materials, and in a style of workmanship, substantial and neat. From the progress made, and the manner of execution, I am satisfied, and it is not more than an act of justice, to express the opinion, that the acting canal commissioners, the engineers, and others engaged in conducting the operation, are entitled to much credit for their exertions, their diligence and zeal, in the prosecution of it. The success of the operations, in execution of this grand object of improvement, so far as they have been prosecuted, hold out encouragement, to persevere in the same policy, and justify the hope, that the whole work will be completed within the time proposed, and short of the estimate of costs first calculated on. The experiments which have been made on the use of the inclined plane, as a substitute for locks in canals, appear to attest their utility in the situations where considerable elevations are to be overcome. The inclined plane is considered to be preferable to locks, in respect to a saving in the expenditure of water, and in the time required for passing the elevation and also, in the cost of construction.—Should these advantages be fully attested, it would be proper that we should avail ourselves of this improvement. Economy, in the use of water, would recommend its adoption at several points on the canal, particularly at the junction of each, with the Ohio river. The distance of these points, from the sources

of supply, and the loose texture of soil in the intervening space over which it will pass, will create extensive leakage, and render any saving in the use of water, an object of importance.

The constitution recognizes the existence of a treasury department. The provision that "no money shall be drawn from the treasury, but in consequence of appropriations made by law," presupposes, that the treasury will be the depository of the public moneys, whether they are products of revenue, or of loans: a system then, under which the principal part of the public moneys can be obtained, and expended, without reference to that department, cannot well accord with the principle of the provisions that have been adopted by that instrument, for the safe keeping of the public funds, and accountability in their expenditure. It is difficult to reconcile with the principles of a government of separate departments, having distinct powers, the acts which depend for their origin and execution, throughout, on the legislature alone. Legislative acts cannot properly be carried into execution by their own agents, especially by such as do not sustain official character.

A system such, is also attended with inconvenience, in practice. The duty enjoined on the Executive, to give information to the General Assembly of the state of the government, cannot be advantageously fulfilled, unless that department is made the depository of official information, and unless in some measure, the office be connected with the execution of the laws. Experience has shown, that in the existing state of our laws, that duty cannot be performed with satisfaction to the officer who is entrusted with the discharge of it, nor with advantage to those for whom the information is intended.

SECOND ANNUAL REPORT OF THE CANAL FUND COMMISSIONERS.

11th December, 1826.

TO THE GENERAL ASSEMBLY OF THE STATE OF OHIO,

The Commissioners of the Canal Fund respectfully submit the following report:

The fact is generally known, that soon after the Commissioners had negotiated the canal loan for last year, the prices of stocks, even of more extensive and better established reputation than ours, became much depressed, in Europe and America, from causes too notorious to require a description in this place. The advices from their correspondents, confirming the intelligence in the public journals, convinced the Commissioners, that the interest of the canal fund would be promoted, by postponing the grand loan of 1826, so long as the public works, and our other resources would permit. The advantage of such delay being evident, the commissioners immediately attempted to avail themselves of their authority, to contract loans for short periods; and discovered, with great concern, that the relief to be relied on at home, from that resource, would be inadequate to continue operations on the canals, till such time as the probable revival of business in the eastern cities, should promise favorable proposals for the more permanent loan. All new contracts being necessarily suspended till such a loan could be obtained, and those already entered into demanding a certainty of additional supplies before midsummer, the Commissioners felt themselves compelled to make an effort for means, in Philadelphia and New York. Their attempts to borrow for a few months, altogether failed in those cities.

The Commissioners are not aware that any distrust whatever, of the solvency or good faith of their state, was an impediment to their success. They ascribed the failure to the unsettled state of affairs, disturbed by the year's events, while it formed an additional motive for leaving the grand loan unat-

tempted, as long as it could be deferred. The state of the stock market at length began, and continued gradually, but slowly to improve, till the 20th of July last, when a contract was concluded with John Jacob Astor and others of New York, for a loan of one million of dollars, bearing an interest of six per cent. per annum, payable semi annually, on the first of January and July, and redeemable at the pleasure of the state, after the year 1850; the lenders paying a premium of \$8,474 76. The high credit of this gentleman, with the great influence of his opinion, and that of others interested in this concern, joined to the actual improvement in the price of this stock, relieves the commissioners of their principal anxiety concerning the terms of future loans; especially as they have the gratification to find, that the more the state of Ohio becomes known the more she is respected, and the better her credit established.

The commissioners submit a statement of the canal fund, composed of the following items, viz:

Appropriations from the Treasury in 1825,	\$43,000 00
Loan of 1825,	390,000 00
Receipts of the loan of 1826, prior to Sept. 21st,	594 840 76
Temporary loans, from the banks of Lancaster and Marietta,	40,000 00
Interest on deposits in N. Y. to January 1st, 1826,	6,608 20
Appropriation from the revenue of 1825,	30,000 00
Balance of loan of 1826, unpaid Sept. 21st,	403,633 99
Total,	\$1,508,082 95

Of this sum there has been deposited on several requisitions of the Board of Canal Commissioners, during the year 1825, in the Lancaster Ohio bank,

In 1826, Lancaster Ohio bank,	\$56,000 00
do. Add their temporary loan,	308,000.00
	30,000 00

394,000 00

In 1825, in the Western Resarve bank,	105,000 00
In 1826, do. do. do. do.	357,000 00

462,000 00

In 1825, in the bank of Columbus,	20,684 72
In 1826, in the bank of Marietta,	10,000 00

do. 1825. paid President Board of Canal Commissioners, appropriation of February.	3,000 00
Expenses Commissioners of the Canal Fund,	591 30
1826, interest of 1825, on 5 per cent. loan,	7,511 45
Interest temporary loan, L. Cass,	123 75
do. do. E. Buckingham jr. & Co.	32 34
Repaid bank of Marietta loan and interest,	10,225 00
Personal and contingent expenses of the Commissioners of the Canal Fund,	1,302 00

22,785 84

Total drawn from the Canal Fund,	909,470 56
Balance remaining,	598,612 39

\$1,508,082 95

Of the above balance of	\$598,612 39
sufficient will be required to repay the Lancaster Ohio Bank, their temporary loan,	\$30,000 00
And an estimated interest on the loans of the last and present years, amounting to	37,000 00
	<hr/>

67 000 00

The remaining sum amounting to	\$531,612 39
will be applicable to future operations on the canals.	

The terms, on which the last loan was contracted, left to the option of the lenders to pay by monthly instalments of ten per cent. or at shorter periods. Judging from the large amount received prior to the 21st of September, (the date of our last advices from the Manhattan Bank,) it is reasonable to expect, that nearly the whole loan will have been received before the first of January. By the agreement with the Manhattan Company, which remains unaltered, an account stated should be furnished annually by them immediately after the January payment of interest. We may therefore expect to receive, early in next month, a statement in detail, of the sums there placed to the credit of the Canal Fund; with a particular account of the interest paid to stockholders, and the interest that has accrued to the fund on deposits. Until this statement shall be received, any estimates in relation to the interest account of 1826, and of the amount received on account of the last loan, must necessarily be vague and conjectural, in several respects. For this reason, no notice is taken in the foregoing statements of the interest due for deposits in the Manhattan bank; but we entertain no doubt of its sufficiency to meet the interest on the temporary loans and advances made to the fund, by the banks of Ohio.

In the application of the above	\$909,470 86
drawn from the Canal Fund, satisfactory vouchers have been furnished of payment of the following items:	

For work done during the year 1825, on the canals as per our statement of December last,	\$118,856 00
For contingencies as per same statement,	13,285 00
Expenses Canal Commissioners,	262 92
Do. Commissioners Canal Fund,	591 30
Western Reserve bank, collecting draft on the Treasury,	20 00
	<hr/>

\$133,015 22

Interest of 1825, on 5 per cent. loan,	7,511 45
do. on temporary loan, L. Cass,	123 75
do. do. E. Buckingham, jr. & Co.	32 34
do. do. and principal, bank of Marietta,	10,225 00
	<hr/>

150,907 76

Leaving a balance yet unaccounted for, of	\$758,562 80
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The whole of which, is supposed to have been expended, and a considerable sum is believed to be due to contractors, on the Miami line; but the accounts and vouchers have not yet been put in our possession. When these shall be received, and the Canal Commissioners shall have communicated the probable rate of expenditure, during the coming season, we shall be enabled to decide how soon it will be necessary to contract for a new loan. At present

sent, we can form no just opinion how soon the funds, at our command, will be exhausted. Owing to this cause, and others apparent from the facts beforementioned, the Commissioners of the fund cannot now estimate, with sufficient exactness, what provision may be required to meet the interest of 1827. When the accounts and vouchers of the acting Canal Commissioners, and those of the banks, (our agents) shall have been compared, and the January statement of the Manhattan bank received, the Commissioners hope to lay before the Legislature, all the information now deficient, concerning their charge; and to submit such estimates and recommendations as their duty may require of them.

The Commissioners further respectfully report, that the periods of their several terms of service have been determined by lot, in the presence of the Governor, and William W. Irvin, of the House of Representatives; when it was ascertained that the term of Simon Perkins will expire in two years from the time when his predecessor was appointed; that of Ethan A. Brown, in four years; and that of Ebenezer Buckingham, in six years from the date of their appointments.

ETHAN A. BROWN,
E. BUCKINGHAM,
SIMON PERKINS.

December 11, 1826.

Extract from Governor Trimble's Inaugural Address, 19th December, 1826.

That Lake Erie and the Ohio river, can be connected by a navigable canal, for a sum within the estimates which have been made, and that our state can obtain the means, by which to accomplish this great object, can no longer be questioned. If there are any who yet doubt the utility of canal navigation, or entertain fearful apprehensions of oppressive taxation, let them cast their eyes to the great state, whose noble example we are imitating, and witness the effects of this policy, on the agricultural, manufacturing and commercial interests of that country, producing a train of blessings which extend and multiply with a rapidity that baffles all calculation; and the fears and forebodings which the novelty and magnitude of our own grand enterprise, was calculated to produce, will be forgotten in the pleasing and certain prospect of securing for ourselves, at an expense, comparatively small, and at no distant day numerous and durable benefits, the benign influence of which, will be extended to the latest posterity. Whatever difference of opinion, has heretofore prevailed, as to expediency of commencing this important work, there can now be but one sentiment entertained, in relation to the course proper to be pursued. The interest, the honor and future prosperity of the state require, that opposition shall cease, and local partialities and sectional prejudices be sacrificed on the altar of patriotism. That we rely on the faith of the state, pledged by a solemn Legislative act, and with a magnanimity and public spirit becoming freemen, anxious for the general good, unite our active energies, in support of a measure upon the ultimate success of which so much depends.

FIFTH ANNUAL REPORT OF THE CANAL COMMISSIONERS.

19th December, 1826.

TO THE GENERAL ASSEMBLY OF THE STATE OF OHIO:

In obedience to the "Act to provide for the Internal Improvement of the state of Ohio by navigable canals," the board of canal commissioners now

submit the following report of their proceedings and views, in relation to the work entrusted to their superintendence.

A strict compliance with the wishes of the General Assembly, in relation to the time of making our annual report, has been prevented by the complicated duties which devolve on the acting commissioners: particularly near the close of a season, in which a large amount of work has been done, and consequently numerous accounts remain to be collected, closed and arranged, as well for the purpose of leaving the work in a proper state, as for presenting to the General Assembly a correct view of the condition of the work, and statement of the accounts connected therewith.

Of the Northern Division of the Ohio Canal.

At the meeting of the board in Columbus last winter, it was determined to continue the canal farther down the valley of the Cuyahoga, than was originally contemplated, and terminate it by dropping into the river at the village of Cleaveland; thus substituting less than three miles of canal, in lieu of upwards of four miles of river navigation. Several reasons, besides that of diminishing the distance to be navigated by boats forever, concurred to produce this determination. The short bends in the river would necessarily occasion some inconvenience in its navigation, which would be increased to a considerable extent, by the bars or shallow places extending from the points several rods into the river. A bar across the stream, near the upper part of that section which it was proposed to navigate, would not, it was feared, admit the passage of deep laden boats at the lowest stage of water; occasional inconvenience would also be experienced from drift wood, as well as from a strong current in high floods. The donations offered by the citizens of Cleaveland, to the canal fund, on condition of terminating the canal at that village, and the superior value given by such a termination, to the water power created by the canal, also operated as inducements for extending the canal farther, and terminating it nearer the Lake than the point designated in the first survey. About 20,000 dollars is added to the expense of the canal by this extension of the line; but it is believed that this difference in expense will be more than counter balanced by the advantages, to which we have here adverted.

Proposals were received, and contracts were entered into for the construction of this part of canal in February last, which require its completion at as early a date as that fixed for the completion of the other parts of the canal, north of the Portage summit.

Although the work on that part of the Ohio canal, which was under contract, was not wholly suspended during the winter, yet its progress was necessarily slow, and in some instances prosecuted at a great disadvantage to the contractors, especially during the latter part of the winter, on account of the inclemency of the season. On the opening of the spring, vigorous operations were again commenced, along the line from the Portage summit to the Lake, and the contractors have, with a few exceptions, prosecuted their work with reasonable energy throughout the season. A scarcity of laborers was, however, experienced on this part of the canal during the spring and summer, which operated materially to retard the work. This scarcity was in a great measure, occasioned by the absconding of a few contractors and sub-contractors, leaving their laborers unpaid, and thereby creating a general distrust as to the certainty of obtaining payment for work done on the canal—of the causes and effects of this evil, and the measures taken to prevent, as far as possible, its recurrence, we shall have occasion to speak more fully hereafter.

The prevalence of diseases, to which situations in the neighborhood of marshy grounds and stagnant waters, are ever more or less subject, also con-

tributed to prevent the vigorous prosecution of the work, on some sections peculiarly exposed to their influence. An apprehension of sickness, also, contributed to the scarcity of hands, during the unhealthy season, in these districts.

Although these causes, combined with others of less note, have prevented the finishing of the canal between the Portage Summit and the Lake, within the time limited by the contracts for its completion, an event which had been expected with some confidence by the commissioners, still it is believed that few if any instances have occurred in our country, where an equal amount of work, of a similar kind, has been performed in so short a time. It will be recollected that this part of the Ohio canal comprehends a much greater amount of lockage than any other portion of equal length. In proceeding from Lake Erie to the Portage summit level, a distance of 37 miles, an ascent of 395 feet is encountered, requiring to overcome it, 44 locks; several points presenting considerable obstructions to the making of a canal, also occur in this distance, contributing to increase the difficulty and expense of the work. The Cuyahoga river is turned out of its course, and a new channel for its waters formed, in four different places, to make room for, and give security to the canal; and in several other places, part of its channel is necessarily occupied, requiring protection walls to secure the banks of the canal from the action of the current in the river. The main river and two of its branches are also crossed by aqueducts; two other branches are crossed by dams of considerable extent.

Most of these heavy items of work have already been performed, besides the ordinary work required in the construction of a canal. The walls of 32 of the locks are laid, and the other work appertaining to them, is nearly or quite completed. Six of the remaining locks are in a state of great forwardness, and would have been finished, but for the approach of cold weather, which made it proper to suspend the further progress of the mason work until the ensuing spring. The foundations of three more are laid; and nearly all the materials necessary for the completion of all the locks which now remain unfinished, between the Portage summit and the Lake, are prepared and delivered in places convenient for the vigorous prosecution, as early in the spring as the state of the weather will admit; except for two locks, at the northern termination of the canal. Circumstances, which it is unnecessary here to detail, have operated to retard the fixing on the precise plan and location of these two locks, and it was not considered necessary to urge their immediate completion, as the commercial business of the succeeding year on the canal, will suffer no material inconvenience on account of this delay.

On this part of the line, nine culverts of stone, six of wood, three dams, and two aqueducts across branches of the Cuyahoga river, have been erected; and the aqueduct over the river at the Peninsula, is in a state of forwardness, which renders the work safe, and promises its early completion in the spring. Seven road bridges and a number of towing path bridges have also been erected.

Of the more ordinary work, appertaining to the construction of a canal, such as excavation and embankment, a large proportion is entirely finished and taken off from the hands of the contractors. Far the greater part of the remainder is as nearly finished as the season will admit, only requiring for its completion a little work in trimming the banks, after the frost shall have left the ground in the spring. The work on a few of the sections is more backward, but should the winter prove favorable to the prosecution of the work, little, except masonry, will remain to be done in the spring. It is impossible to ascertain the precise amount of work which remains unfinished on this part of the canal, without a very minute examination and estimate; nearly nine-tenths, however, of the whole amount of work necessary to the

completion of this division of the Ohio canal is done, and it is believed, in a neat, substantial and permanent manner.

Water, to a moderate depth has been admitted into several parts of the canal north of the Portage summit, to the length of some miles, and has by its unerring test demonstrated the correctness of the levels taken by the engineers. The banks of the canal so far as they have been tried by water, prove to be as substantial and tight as had been anticipated.

It is confidently believed that so much of the canal as extends from the Portage summit to the basin, near its termination at Cleaveland, will be finished and ready for navigation in June next; the work is now in a state of forwardness which warrants this expectation, and no ordinary event will prevent its being realized.

The heavy rains which fell in the latter part of the month of June, produced a freshet in the Cuyahoga river and its branches, which occasioned some damage to contractors, whose work in the valley of that river, was in an unfinished and insecure state, and exposed to the violence of the flood. The amount of damage thus sustained, has not been precisely ascertained; it is believed, however, that the aggregate amount will not vary materially from two thousand dollars. The crib work of hewn timber, designed to protect the bank of the canal from the abrasion of the current, where the canal occupies part of the bed of the river, at the Pinery narrows, suffered most materially from the freshet. Several of the contractors, contrary to the advice of the engineers and acting commissioner, had extended their crib work along the whole, or nearly the whole length of these wash banks, without raising it to the proper height; and had suffered it to remain unfilled, or but partially filled with stone and gravel, instead of raising the work to the full height required, as they advanced, and filling the cribs; which would have given security against the operation of the floods. The consequence, as had been anticipated, was the displacing and loss of a large quantity of timber by the freshet; whilst the works along the river, which were finished or nearly so, and those which had been conducted in a prudent and careful manner, though unfinished, sustained no material damage.

A few cubic yards of earth were washed away from the unfinished embankments near Akron, by drawing down the waters of the summit pond more rapidly than was intended. These damages, however, were trifling, and were more than compensated by clearing the canal, between the summit pond and Akron, from the muck which had floated down from the deep cutting, through earth of that description, near the summit pond. This circumstance would not have merited notice, had not a fictitious importance been given to it by exaggerated and erroneous publications.

During the last winter and the preceding fall, the line extending from the summit pond to the Tuscarawas, and southwardly along the valley of that river as far as the Great Bend, near the line between Stark and Tuscarawas counties, was re-examined. Surveys were made and levels taken on both sides of the river, from which estimates of the relative cost and length of the line on each, were made. After a full and careful examination of the subject, it was determined to continue on the right bank or side of the river, to a point something more than a mile above the mouth of Chippewa creek, there to cross the stream by means of a dam, introducing its waters, or so much thereof as may be found necessary, into the canal—thence proceeding on the left, or east side of the river to the Great Bend, there to re-cross to the right bank on an aqueduct. This route was adopted, as being at once shorter, cheaper and more easily and certainly supplied with water, than any other which presented itself for consideration.

Twenty six and a half miles, extending from the summit pond, to a point below the new town of Massillon, in the county of Stark, comprising four

locks and one guard lock, were prepared, and proposals for its construction were received at Kendall, on the 18th day of January last. The contracts for this part of the canal were generally entered into, during the succeeding month and the work soon after commenced. Although the work on some sections was partially suspended during the latter part of the summer and beginning of autumn, by the prevalence of those diseases common to that season, in exposed situations, yet the work has, on the whole, progressed with great rapidity; and nearly two thirds of the whole amount on this division of the canal, is already accomplished. Far the greater proportion of the materials necessary for building the locks are prepared and delivered on the ground, near the sites designated for their erection. The time limited by the contracts for the completion of this part of the canal expires on the first day of July next; and the contractors who have the heaviest jobs to perform, express great confidence in their ability to finish their work within the time limited.

While the work was progressing on that part of the line already contracted a party was fitted out and employed in making the examinations and surveys necessary to a final location of the canal, extending from the southern termination of that part of the line previously put under contract, to a point near the village of Goshen, in Tuscarawas county. William R. Hopkins, a young gentleman of much science, and considerable experience in engineering, was put at the head of this party. This division of the canal, was prepared for work, and proposals were received for its construction, at New Philadelphia, on the 18th day of October last: The contracts entered into, require its completion, by the first day of July, 1828; and the work on many of the sections, has already been commenced.

It was thought desirable, by the acting commissioner, so to locate the canal in the neighborhood of New Philadelphia, as not to injure the prosperity of that town, by diverting its commercial and other business, to another point in its vicinity. The citizens of that town, felt much solicitude on the subject. Considerable time, and much exertion, were used to find a route, and devise a plan, by which the canal might be conducted along the east side of the river, so as to pass through, or near the town: The result of the examinations, surveys and estimates, however, proved that this desirable object could not be attained, except at an increase in the cost of making the canal, of from forty to fifty thousand dollars, beyond the expense of the route now adopted, also, subjecting the canal to the hazard of crossing and recrossing the river, which is here a large and powerful stream. The line was, therefore, permanently fixed on the right, or western side of the river, from the crossing at the Great Bend, agreeably to the original plan.

It is believed, that New Philadelphia, may be brought to participate freely, in the benefits of canal navigation, by making a short cut from the canal to the river, opposite to the town, and uniting it to the river, by locks of cheap construction. This arrangement, if made, will enable boats to pass and repass from the river, or basins connected with it, adjoining the town, into the canal with little inconvenience. A due regard to the interests of New Philadelphia as well as to the public convenience, and the revenues to be derived from the canal, may justify the expenditure of a moderate sum, in assisting the citizens of that town, to accomplish this desirable object.

Great competition among the numerous applicants for canal contracts, occurred at the lettings, both at Kendall, and at New Philadelphia. For the 110 sections, into which the line now under contract, south of the Portage summit, is divided, near six thousand bids, making an average of about 54 proposals on each section, were received by the acting commissioner, examined and carefully compared with each other. In order to determine which of the applicants are entitled to contracts, it becomes necessary to enter into an

arithmetical calculation on a large proportion of the bids, computing the sum of each of the various kinds of work, which occur in any given section of the canal, at the prices contained in the proposals, adding all these sums together, in order to ascertain the total amount, and comparing this amount with every other proposal, for the same section, unless the disparity is so great as to be obvious on bare inspection. This, though a laborious undertaking, is necessary for the interests of the state, as well as to do justice between the several applicants, but a small proportion of whom can be accommodated with jobs, where the number of bidders so far exceeds the number of sections to be let.

Sixty one miles, extending southwardly from the Summit Pond, at the Portage summit, have been put under contract since our last report, on terms very favorable to the state. The length of this part of the canal, has been diminished about three miles, compared with the length of the original line located between the same extreme points. Part of this saving in distance, was however, anticipated, as will be seen by the report of the Board to the General Assembly, of January 8th, 1825.

Between 99 and 100 miles of connected line, extending from the village of Cleveland, southwardly to Goshen in the county of Tuscarawas, is now under contract excepting those sections which have been completed and accepted: the towing path along the Summit Pond, and four or five sections on the last letting, for which contracts have not yet been concluded owing to accidental circumstances. As these sections, however, have been assigned, and the contractors are ready to enter into agreements as soon as an opportunity for doing so shall occur, the work may all be considered as being under contract. The cost of constructing this division of the Ohio canal, estimating the various items of work at contract prices; and calculating the quantity of each item, from the most accurate data in our possession, will amount to the sum of \$762,770 00. The value of work actually performed on this part of the canal, agreeably to the certificates of the resident engineer, is \$465,870 69. Of this, \$392,993 01, has been performed between the Portage Summit and the lake, and \$72,872 68, south of the Portage Summit. The amount of money paid to contractors on this grand division of the canal, previously to the first day of December instant, is \$411,302 49. Of this sum, \$356,548 17, has been paid for work done north of the Portage summit, and \$54,754 32, for work performed south of that point. Previously to the first day of December, 1825, \$63,279 00 had been paid to contractors, as will be seen by our report of last winter; and the remaining sum of \$348,023 49, has been paid between that date and the first day of December instant.

The cost of this grand division of the Ohio canal, was originally estimated at \$905,374 00; to which sum should be added \$20,000 00 for the extension of the line at the northern, and beyond the point then proposed for its termination, as hereinbefore described. After adding to the present estimated cost, the sum of 40,000 00, to cover the expense of superintendence and unforeseen contingencies, it appears from the foregoing calculations, that there will be a saving to the state in the cost of this part of the canal, of more than \$100 000.

It is not pretended that this calculation, in regard to the expense of construction, is perfectly accurate. From its nature, it is not susceptible of being reduced to perfect accuracy, until the completion of the work. Unforeseen changes in the line or plan of construction, made for the purpose of adding to the utility or security of the canals, or for the prevention of injury to the owners of adjoining lands, often becomes necessary during the progress of the work; and generally add something to its cost.—So much of the work is now

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY, BY JOHN KILBOURN, AT \$3 A YEAR, IN ADVANCE.

VOL. I. COLUMBUS, OHIO, SATURDAY, OCT. 4, 1828. NO. 16.

Readers will notice that the Ohio Canal documents are continued on the third page of every number, from the last page of the preceding number.

PUBLIC LANDS.

In the 14th number of this paper, page 209, we noticed a project for graduating the price of the public lands, belonging to the national government.

We do not approve thereof, for these reasons: we believe the inevitable effect of that measure, whether so intended or not, would be to throw, during that year, when the lands should stand at twenty-five cents an acre, the whole of the then unsold national domains, *en masse*, into the hands of great land speculators and foreign capitalists. For, if the requisite amount of money to purchase them with, say fifty, or an hundred millions of dollars, could not be raised in our own country, speculators could send to Holland, and borrow it, at 2 1-2 per cent. annual interest, upon a pledge of the lands.

In the western part of the state of New York, the people have seen, and now feel the evils of foreign owners of extensive bodies of their soil: although the *Holland Company's Lands* amount to less than 3,000,000 of acres. What then would be the evils of having foreigners own one, two or three hundred millions of acres of our national domains!!

That such would be the unavoidable result of a law thus graduating the price of these lands, is believed, for the following reasons.

In the year 1786, the *Ohio Company* purchased, of Congress, their tract, of somewhat less than one million of acres at 33 1-3 cents an acre—and shortly afterward, J. C. Symmes purchased his tract, of 311,000 acres about Cincinnati, at 67 cents an acre—and soon afterwards, various individuals in Connecticut and Massachusetts, purchased the whole of the Connecticut Western Reserve, amounting to nearly 4,000,000 acres, at one third of a dollar an acre.

These statements of facts, are made from memory alone, without reference to any official documents; but are believed to be substantially correct.

These extensive purchases, and at the prices stated, were all made, when almost the whole

country, west of the Alleghany mountains, was one unbroken, howling wilderness. How much more readily would foreign capitalists now purchase up the new lands of the west, at only 25 cents an acre? And then gradually, sell them out, at \$2 00 to \$5 00 and \$10 00 an acre, to actual settlers.

A landed aristocracy would thus be insinuated into our government, which might, eventually, change its very nature; and assimilate it to the old feudal governments of Europe.

The reason why all the public lands do not, *immediately* sell, is not, (as has been alledged,) because they are not, intrinsically worth the present government price of \$1 25 per acre; but, because there are not, at present, people enough in the United States, who want every eighty acre tract, (or half quarter section,) in our country, for actual settlement: but, there probably will be enough, in one or two centuries.

But if any change, or modification of our present land system must take place, we should like that, which was prayed for, by considerable numbers of citizens of this state, in certain petitions presented to Congress last winter—one to the Senate, by Mr. Ruggles, and another to the House of Representatives, by Mr. Vinton: of which the following is a copy:

"MEMORIAL TO CONGRESS.

We the undersigned, citizens of respectfully pray that Congress would pass a law, to have concurrent force and effect with the existing land laws, to this purport:

That each and every white male inhabitant of the United States over 21 years of age, and whoever, of that description of persons may hereafter attain that age, who pleases, shall be authorized to select for himself one half quarter section of land, equal to eighty acres, wherever he may choose, from among the public lands, which are now, or may hereafter be authorized to be sold at \$1 25 cents per acre; under the existing laws, for which he, shall receive a patent in fee simple, free of all expense; with only this one condition: namely, that he shall reside thereon during life. And if he shall so reside thereon, then it shall descend unconditionally to his heirs, in the same manner as all other real estate does or may descend. But, if he shall remove his residence therefrom, during his lifetime, then the land shall revert back again to the general government, together with all improvements thereon. But, should he, at any time wish to sell it, he may do so, by first paying up the originally

established price of \$1 25 per acre, and interest from the time of entry, until such payment."

This memorial does not pray for the repeal of any part of the existing land laws; but merely to introduce an *additional* mode, by which lands can be procured, for actual settlement, both by those who have, and by those who have not money to purchase land with. And if this plan was to be adopted, probably, many individuals would enter one eighty acre tract, under this new provision, and purchase another adjoining, with their money, at \$1 25 an acre.

The reason why the exact amount of eighty acres is prayed for, is, that all the public lands are now surveyed, into and sold in such tracts: and somewhere near that quantity is wanted, to support a family; and more is not needed for a man to cultivate, with his own hands.

There are many considerations, which might be urged, in favor of this plan of granting lands to actual settlers. Many individuals conscientiously believe that every individual of the human family, who chooses to live, by cultivating the soil, has an inherent right to such a portion of the earth's surface, as with due cultivation, will support him, and his family, who may be dependent upon him for support.

Many also believe that something of Mr. Owens system should be introduced into our social institutions. Now it would seem that this donation plan would introduce most of the substantial benefits of that system: without the evils and inconveniences of the common property system. Because it would provide a footing, upon the soil of the earth, for every man able and disposed to labor, from which he nor his family could be driven, during his lifetime. It could not be taken by creditors; because his title to it, other than its occupancy, does not become perfect until his decease. The title is then perfect in his heirs, and it may then be, by them, sold, or taken for debt, the same as any real estate may now be sold, or taken. And, under the continued operation of this system, his sons, as they should successively attain twenty one years of age, would each be entitled to enter another similar tract for himself.

Nor would it introduce the evils of perpetual entailment of lands; for they would all come under the ordinary operation of the several state laws, (in which they are respectively situated,) for the sale of lands, to pay the owner's debts, as has been before mentioned, immediately upon the enterer's decease.

And furthermore, by getting a thriving family, upon every half quarter section of land, in the western states, who would consume more dutiable foreign articles than would otherwise be purchased, it is believed that the general government, even in a pecuniary point of view, would not suffer: but, on the other hand, would derive a full equivalent for eighty acres of wild land.

But, in a moral point of view, by removing man from want, that prolific source of crime, it is believed that the beneficence of the measure would be pre-eminent. On this head, the field is so ample, that volumes might be written. But, as this article is already considerably extended, we close, for the present.

New Coach.—Our enterprising fellow citizens of the Citizen's Line, are constructing a coach to be run between Bordenton and Washington, which will alarm the citizens of New Jersey, if they should happen to see it before they are apprized of its nature. It is calculated for fifty six passengers, two regular stories high, and is to run upon four wheels 17 inches and a half broad, and to be drawn by 12 horses commanded by postilions. The baggage will follow in the rear on one broad wheel of about 40 inches; the whole machine will thus form a roller to flatten and smooth the road over which it passes. It is in a state of considerable forwardness, and will be exhibited as soon as the trimmers and painters finish their operations.—*Aurora.*

Inland Navigation.—The Albany Daily Advertiser notices the arrival on Saturday, of the canal boat Mary, of Milan, Capt. Edward Meeker, from Huron county, state of Ohio, with a cargo of pot ashes, staves and sundries. This boat was built in Huron, at the head of Lake Erie. She crossed the lake 250 miles to Buffalo, and thence by way of the Erie Canal, 363 miles to Albany, and is bound to New York, making total distance 762 miles. She is 49 tons burden, and is schooner rigged, and carries two masts. We believe she procured a clearness at the custom house at Milan, for the port of New York.

Same day, arrived at Albany, 88 boats, and cleared 42 boats. The Northern Canal is now navigable to Whitehall.

The U. S. revenue cutter Benjamin Rush, was launched at the Navy Yard at Erie, Pa. on the 13th inst. She is a very neat model, and carries about 35 tons, and is intended by government for the Upper Lakes—to be commanded by Capt. G. Knapp, of that borough.

The ship Canada, which lately arrived at New-York, from Liverpool, brought out 545 tons of rail-road plates, for the Delaware and Hudson Canal and Rail-Road Company. The John Jay brought 3256 plates for the same company. We have heard that a locomotive engine, for this rail-road had previously arrived.

finished, and that which remains unfinished, with the exception of that part last put under contract, is in such a state of forwardness, that a tolerably accurate estimate can now be made of its cost.

Examinations have been made and levels taken with a view of introducing a feeder into the canal, taken from the Tuscarawas river, a short distance below the mouth of Stillwater. It is proposed to make this feeder navigable, so as to permit boats which may navigate that stream to pass into the canal, by these means enabling the inhabitants who reside on its borders, to participate in the benefits of the canal. The ground over which this feeder must pass, is very favorable for that purpose; and the chief item of expense attending this plan will be the erection of a dam across the river.

A party is now engaged in settling the final location and preparing for contract, that part of the canal which extends from Go hen to Co-shocton; which it is expected will be ready for work early in the spring should the winter prove favorable to continuing the surveys.

Of the Middle Division of the Ohio Canal.

Operations on this line, were somewhat retarded by the frost and rains of the winter and spring. The greater part of it lying in a very level and flat situation, and the whole line passing through a stiff clay soil, the effects of the winter and spring were discouraging to the operations of the contractors and but little work was done until the month of May. About this period the work was resumed with good effect, and has been continued generally in a very satisfactory manner through the season. The result has been the completion of the greater part of the contracts on this line; and those yet incomplete are in such condition that they may be finished by the first of June, and this line of ten and a half miles fully prepared by that time for the reception of the water. The masonry, consisting of four culverts and three aqueducts, (two of them of small size) is completed.

The great reservoir connected with this summit level, which has excited so deep an interest with the commissioners and with the public, has progressed in a manner highly satisfactory, and though not entirely completed, is now in readiness to receive the streams destined to fill it. This work upon which so much of the public interest depends has been constructed with much care, and in a manner substantial and permanent corresponding with its importance.

It has been deemed prudent with a view to increase the strength of the embankment, and to afford the means of sustaining a greater depth of water in the reservoir if it should be found necessary, to construct a heavier and higher embankment than was in the first instance proposed and estimated, and to increase its length about eighteen chains. This has added more than 60,000 cubic yards of earth to the work, but it is believed the public interests will have been promoted by the measure. The board, also, deemed it advisable to construct in the embankment, an extensive waste weir and flood gate, by which the surplus water of the reservoir may be discharged with safety, and its whole water drawn off to the bottom when necessity or policy shall require it. A feeder lock has also been introduced into that part of the embankment which separates the reservoir from the canal by which to pass the water from the former into the latter as it may be required for use. The experience of the last spring has shown the necessity of protecting about five miles of the canal adjoining to and north from the reservoir, from the effects of the great accumulation of water on the flat lands above, by cutting extensive side ditches and drains to pass the water off, which would otherwise in many cases overflow and destroy the banks; and by constructing much more extensive water ways under the canal than the small culverts first contemplated and estimated. These additional and most of them unforeseen iter

will necessarily add a very considerable sum to the final cost of this line, but not a sum equal to that which will be saved in the construction of the adjoining parts of the line which have been placed under contract during the past season.

On the 5th of September, the Deep Cut, three miles and nine chains in length, which separates the valleys of the Scioto and the Muskingum, and a feeder, six miles and forty three chains in length, from the south branch of the Licking to the reservoir, were put under contract, the former to be completed by the first day of October, 1828, and the latter by the 15th of December instant. The deep cut was let in two contracts to responsible and experienced men upon terms highly favorable to the interests of the state. If this work shall be completed at the contract price, there will be a saving upon it when compared with the original estimate of its cost of more than \$40,000. The contractors are making extensive preparation for its prosecution, and have already commenced operations in a manner which give evidence of a determination to prosecute it vigorously.

The contracts for the feeder were made at prices as low as it was believed would comport with the interests of the state; and the work was commenced almost immediately after the contracts were closed, and has progressed in a very efficient and spirited manner. It was considered an object of importance to effect the construction of this feeder, in season to fill the reservoir by means of the spring floods, and thus to be enabled to test the effects of the ensuing summer and autumn upon it. This desirable object it is now believed will be accomplished. The estimated cost of the feeder at contract prices is a little rising of twenty thousand dollars; the estimated amount of work yet to be performed upon it, to accomplish its completion, is less than 1,500 dollars.

There has been paid to the contractors on this line of canal, the reservoir and the feeder, during the year ending the first of the present month, \$84,001 68, which with \$23,583, the amount paid in the last year is, \$107,584 68, the total amount which has been paid on these works.

The final location of the line of canal extending from the Licking summit northwardly, was commenced early in September preparatory to placing it under contract, and on the 27th of November, twelve miles and seventy-five chains of that line extending to the Narrows of Licking, were let to contractors upon terms highly favorable to the public interests. The line let embraces fifteen locks, three aqueducts, and five stone culverts, in addition to the usual variety of earth work, and is contracted to men of responsibility to be completed by the first day of July, 1828. From the most careful and full estimate which can be made of the cost of this line, at the contract prices, it will fall short of the original estimate of the cost of the same line, nearly twenty thousand dollars, notwithstanding upon the original plan the several branches of the Licking were to be crossed by means of dams, instead of aqueducts, which are much more expensive. Preparations are already making by the contractors for commencing the work, particularly the quarrying, cutting and delivering of stone, and no doubts are entertained of its vigorous and successful prosecution.

The following recapitulation, exhibits the number of miles of the canal line, feeder and reservoir embankment, now under contract in this division of the Ohio canal:

	<i>M's</i>	<i>Ch's</i>		
The Summit Level, including the Deep Cut,	13	51		
The line between the Summit and the Narrows,	12	75	<i>M's</i>	<i>Ch's</i>
Total canal line under contract,		<hr/>	26	26
Feeder to the reservoir,			6	43
Reservoir embankment separate from the canal,			2	28
Total canal line, feeder and reservoir embankment			<hr/>	
under contract,			35	10

The final cost of these different contracts, when completed, from the best estimates which can now be made, will be as follows:

The summit level, with the reservoir and works connected with it,	\$118,214 32
The deep cut,	225,000 00
The feeder to the reservoir,	20,000 00
The line between the summit and the narrows,	109,873 00
	<hr/>
	373,087 32

An aqueduct over the canal at the foot of the deep cut, for the passage of the feeder into the reservoir is yet to be contracted. Until the deep cut shall be finished the water of the feeder can be passed into the reservoir without the agency of this work; and when it shall be filled, stone from the hill country bordering on its east end can be transported by water at much less cost than at the present time.

Of the Miami Canal.

A considerable proportion of this line running through a dry and gravelly soil, the operations of the contractors were continued through the winter and spring with considerable success, and during the summer and autumn the work has progressed in a vigorous and efficient manner. Of the 43 miles of this canal now under contract 31 are completed, and the remaining 12 miles, consisting mostly of heavy work at the lower end of the line, are in such a state of forwardness as to afford strong assurances that the whole line will be finished by the 1st of July next. No apprehension of a failure of this desirable result is felt, except as to two or three heavy embankments on Mill creek, and these if the winter and spring should prove favorable for work, it is believed can be completed within that time.

The finished work on this line, in addition to the excavation and embankment of the 31 miles, consists of nine locks, five aqueducts, twenty stone culverts, varying in size from three to twenty feet chord, numerous paved waste wiers, road bridges, &c. The aqueducts and culverts on the whole line are completed, except the planking of the aqueduct trunks, which was directed to be omitted until spring. Of the three locks remaining unfinished, one is very nearly completed, the walls of the second are raised to the upper mitre sill, and of the third to the height of four feet. They will be completed at an early day in the ensuing season.

On the 2d of June last a contract was made for the construction of a dam across the Great Miami river above Middletown, a guard lock, and a feeder 43 chains in length, from the dam to the canal. The work under this contract has progressed so far as to afford an assurance that it can be accomplished in the next season as early as the stage of the river will admit. In the mean time the canal may be supplied with water through the mill race of Abner Enoch, in sufficient quantity to answer all the purposes of navigation.

It was found by observation, during the last spring, that the ponds at the head of Mill creek, in the county of Butler, through which the canal passes, in leaving the valley of the Great Miami, would in that season of the year entirely overflow the banks of the canal, and for some months remain in that situation. To prevent this evil, which would not only at times interfere with the use of the canal, but would in a measure destroy it, it was found to be necessary to drain the ponds by making a cut one mile and seventy chains in length. A contract was therefore made for cutting this drain, the cost of which is estimated at one thousand dollars. It is probably by this time completed.

Contracts have also been made since the date of the last report of the Board for the extension of the canal into and through the city of Cincinnati, to a point near the head of the proposed locks, by which it is to be connected with the Ohio. These contracts, including those for the dam, feeder and pond drain, have been made upon terms as favorable to the state as those heretofore made for the construction of other parts of the work.

So far as the work is now completed, and the final accounts of it made out, it is found, that in plain line the original estimates of the amount of work in each section correspond very nearly with the true result, and that the actual cost of such line will not exceed the estimated cost as stated in the last report of the Board; in some cases it is found to fall considerably short; but on rough, uneven and sidelying ground, where heavy embankments and steep bluffs are encountered, a heavy portion of which is on this line, the engineer's final accounts so far as they are now perfected, shew that the number of yards of excavation and embankment in each section, as then estimated, will fall considerably short of the true result. This deficiency in the estimates on the rough line is to be accounted for in the following manner: In making out an estimate of the amount of excavation and embankment for the accounts of last year, no other data could be had than a single line of levels divided into stations of three chains each, from which the average depth of cutting, or height of the embankments, was inferred. The result now shows that the number of yards then produced falls short, particularly on inclined ground and steep bluffs. In addition to this, it has been found advisable on the heaviest parts of this line, with a view to greater security, to increase the base of the banks, and, where heavy bluffs are encountered, to throw the centre line of the canal farther into the hill or bluff bank, which has necessarily added much to the number of yards of earth to be removed. It has also been found necessary to re-let some of the heaviest of these embankments at higher prices. From the scarcity of stone on the line, it was found necessary in making the contracts for the locks and other stone work to stipulate a given distance within which it was then supposed stone could be obtained, and to agree to pay, where the acting commissioner or engineer should be convinced of the necessity of going farther for stone, for such extra hauling. It has been found impracticable to procure the necessary quantity of stone of a suitable quality within the distance assigned, and an extra allowance for hauling stone has been necessarily made to a considerable amount. Some rock excavation has also been unexpectedly encountered; and several paved waste ways, culverts and some pavement of the banks have been added to it. These items of increased cost, and the unforeseen variations in the amount of work to be performed, will add considerably to the final cost of this section of the Miami canal, when compared with the estimates of last year. The exact amount of the increase, which is chargeable principally to the stone work, and the heavy embankments and bluffs, cannot now be ascertained, as the heavy work on the line is not yet completed, nor is it in such situation as to permit accurate estimates of the cost to be made. On that part of the line between Middletown and the locks near Reading, (31 and a half miles) the excess of the actual cost over the estimates of the last year will be upwards of seventeen thousand dollars.

There has been paid to contractors on this canal and the works connected with it, during the year ending on the first of the present month, \$265,302 98: which with \$31,994, the amount of payments last year, makes the total sum of \$297,296 98, which has been paid on this line.

The amount of the contracts which have been made on this canal, from the final accounts of that part which is finished, and from the best estimate which can now be made of the unfinished parts, is as follows:

The 31 and a half miles contracted to be completed by the 1st October, terminating at the head of the locks, near Reading, (27 and a half miles finished,) \$228,867 20

The line from the head of the locks near Reading to the junction of the Hamilton and Indiana roads, contracted to be finished by the 15th of May next, 169.442

The dam, guard lock and feeder from the Miami, 15.000

The pond drain at the head of Mill creek, 1.000

New line to and through Cincinnati. 19.500

Total estimate of contracts on the line, \$433,809 20

Deducting the total amount of payments, on this line from the estimated amount of contracts as shown above, will leave the sum of \$136,512 22, required to accomplish the works now under contract.

The acting commissioner on this line, as provided by law, has appointed Mathias Corwine of Warren county, James M'Bride of Butler county, and Arthur Henrie of Hamilton county, to be a Board of appraisers for the assessment of the damages claimed by individuals in consequence of the construction of the canal through their lands, and for the materials used in the construction of the works connected with it. The operation of the law in relation to the use of materials for the construction of the canals has produced considerable dissatisfaction on this line; but it is confidently believed there will be a disposition amongst the citizens of that part of the state to acquiesce cheerfully in the awards of a Board of appraisers, composed of men of unquestionably high standing for uprightness of character and good judgment.

In pursuance of the resolution of the last General Assembly directing a location of the line south of Licking Summit, Col. Alexander Bourne of this state was employed, as an engineer and assigned to the discharge of that duty. Instructions were given him, embracing an investigation of all the unsettled questions connected with a final location of this line; and early in June he commenced the surveys at the south end of the Licking Summit. These examinations were successfully prosecuted until the early part of July, when, from the serious indisposition of the engineer, and of his assistant, the surveys were necessarily suspended, and from the continuance of the same cause were not resumed until near the close of the month of October.—Notwithstanding the discouraging and uncontrollable circumstances which have attended this service, the engineer has extended his investigations to a point near Piketon, and has, under the advice of the principal engineer, prepared the estimates and plans of the lines he has run for the inspection of the Board.

In relation to the future operations of the Board, it may not be amiss briefly to remark, that from the commencement of the work it has been deemed expedient, with reference to the best interests of the state to apply the principal force on the Ohio canal, on its northern division, and to apply the means placed at the disposal of the Board in such manner as to effect in the shortest possible time a continuous line of canal navigation from Lake Erie to the interior of the state and thence to the Ohio river. It is very apparent that by pursuing any other course of policy, the anticipations of revenue from tolls, during the progress of the work, which have been made by the Board and expected by the public, must fail to be realized and the public interests sacrificed to the extent of its failure. A connected line of canal, of a given length, will yield to the state a much greater amount in tolls, than can be derived from the same extent of canal disconnected in its parts; and it is deemed highly important to direct our best efforts to the augmentation of the revenue from tolls, at a time when the burthen from taxation will be the

greatest. In pursuance of these views, it is proposed, as early in the spring as the line can be prepared, to put under contract the whole line now remaining open between the Portage and the Licking Summits. By this course the Board expects to be enabled to effect a connected line of canal navigation, from Lake Erie to the Deep Cut on Licking Summit, a distance of 183 miles, as early as the month of July, 1828, and thus to throw open to the whole interior of the state, the advantages of this great work so far as completed. It is also the intention of the Board, to commence operations on the line between Licking Summit and Portsmouth, and on the upper division of the Miami canal, as early after the whole line north of the Licking Summit shall be put under contract, as the pressing duties of the engineer department will allow. There has been a departure from this plan of proceeding only so far as has been required by law. In pursuance of this law, and the motives which governed the Legislature in making it, the contracts on the Licking Summit were made. The reservoir embankment would have been placed under contract by the Board, as a measure of precaution, it being important to test, as early as practicable, the full extent to which it can be relied upon as a source of supply to the upper levels of the canal. It was also considered important to place the Deep Cut under contract at an early period, on account of the length of time required for its completion.

In the prosecution of the work on the canals much difficulty has been experienced in the want of integrity on the part of some of the contractors and their sub-contractors. It is but justice, however, to say that, with the exceptions alluded to, the contractors have generally conducted their business in a manner creditable to themselves and beneficial to the public interests. The effect produced by this delinquency on the part of certain contractors, has been very injurious to the interests of the works, and has very much added to the difficulties which have attended their superintendence. The sufferings and losses in many cases, brought upon individuals who have furnished these men with supplies, and upon the laborers employed upon their jobs, have tended in some degree, to bring the work into disrepute, and to destroy the confidence of the laboring community in the certainty of receiving their wages. The effect for a time was to lessen the number of laborers on the lines, and in the general destruction of confidence produced, to add to the difficulties of the faithful contractors.

It is impracticable to guard altogether against this evil, where contracts are made to so great an extent, necessarily with so many different men, and, as in the commencement of our works, with men in most cases unknown to the acting commissioners. Experience has demonstrated that the most faithless men sometimes obtain letters of recommendation from men of standing and character, and thus are enabled to obtain a confidence which they are not entitled to. Every exertion has been made by the acting commissioners to guard against this evil, and to secure to the laborer, as far as may be practicable, the just reward of his exertions. A vigilant eye will be kept upon contractors in this respect, and where the acting commissioner has reason to believe that a contractor neglects to secure to the hands employed on his job, their monthly wages, all further payments will be withheld from such contractor, until he gives satisfactory assurances that the money he may receive shall be applied to the payment of the laborers employed on his job.

In conformity to a resolution of the last General Assembly, some examinations have been made for the purpose of ascertaining the practicability of making a canal, by the way of Sandy creek and Little Beaver, to connect the Ohio river at or below Pittsburgh with the Ohio canal near the mouth of Sandy. The Board have not been able to complete these examinations as fully as would be desirable in order to settle this question in a satisfactory manner. Having no engineer in their employment whose time could be devoted to

this object without neglecting duties of more pressing importance, Joshua Malin, Esq. an engineer of considerable experience, who is engaged on the Union Canal of Pennsylvania, was employed to superintend such surveys as were made. From these surveys it appears that a canal on this route would involve the necessity of making a deep cut of between one and two miles in length, and from 70 to 90 feet deep at the highest part of the dividing ground; or of making a tunnel of half a mile in length with a deep cut at each end. A reservoir of considerable extent and capacity would also be required, as the running waters susceptible of being thrown into the summit level, are not sufficient in dry seasons for its supply. A situation tolerably well fitted for the formation of a capacious reservoir is presented in the neighborhood; but the sufficiency of the streams flowing naturally into this basin, or susceptible of being thrown into it at a moderate expense, to fill the reservoir to a valuable extent, is a question of much doubt, and one on which we are not prepared to decide.

The Board, in compliance with a resolution of the last General Assembly directing them to cause to be published a map of the State compiled by Alfred Kelley, Esq. appointed a committee to carry into effect the intentions of the General Assembly. This committee addressed a note to Mr Kelley requesting him to furnish them with the map for publication, if in his possession. It appears from his answer, which is herewith submitted, that before the receipt of that communication, and previously to the passage of the resolution, he had put the map into the hands of Horton Howard, Esq. for publication, and that it was therefore out of his power to comply with the request of the committee.

The prospect in relation to the future progress of the work in which we are engaged, is in every respect encouraging. No reasonable doubt can now remain upon the mind of any intelligent man who is acquainted with the subject that the canals will be completed for a sum within their originally estimated cost, provided the work is judiciously managed. No important difficulty, that had not been anticipated, has as yet presented itself calculated materially to obstruct the making of the canals, or to enhance their aggregate expense. The calculations made by the Board in relation to the progress of the work, at the time it was undertaken, have so far more than been realized: And unless some great and unforeseen occurrence should operate to destroy our present anticipations upwards of 100 miles on the Ohio and Miami canals will be navigated in the month of July next, and the state will begin to derive a revenue therefrom, though small in the beginning, one year sooner than was calculated on by the Board, in their report made to the General Assembly at the session in which the law for the making of the canals was passed. The amount of interest payable on canal loans, has, on the contrary been less than was anticipated in that report; owing in a great measure to the judicious arrangements made by the Commissioners of the Canal Fund.

Every motive therefore, as well of profit to the state; advantage, both in a moral and pecuniary point of view, to its citizens, as of state character, which operated with the General Assembly to induce the commencement of the present system of internal improvements, operate, with the additional force derived from past success in its prosecution, to urge a continuance in the policy with confidence and energy. The laws now in force provide, it is believed, ample means to enable those to whom the management is entrusted to go forward with the work as rapidly as a due regard to economy and the means of state will justify; and nothing is now wanting, to ensure the successful and honorable completion of the undertaking, but a steady adherence, on the part

of the people, the General Assembly, and of the agents employed in the direction of the work, to the general outlines of the plan heretofore adopted.
All which is respectfully submitted.

ISAAC MINOR,
T. WORTHINGTON,
BENJ. TAPPAN,
N. BEASLEY,
JOHN JOHNSTON,
ALFRED KELLEY,
M. T. WILLIAMS.

Columbus, December 19, 1826.

ADDITIONAL REPORT OF THE CANAL FUND COMMISSIONERS.

4th January 1827.

TO THE GENERAL ASSEMBLY OF THE STATE OF OHIO,

The commissioners of the canal fund respectfully represent, that having, since their last report, received and compared the abstracts and vouchers of payments made by the Banks, and having inspected the abstracts of the acting canal commissioners, lately received, they are enabled to submit a corrected statement of expenditures, balances and estimates to the General Assembly.

In their report of the 11th of December, the commissioners exhibited that sums had been drawn from the canal fund, and placed, previous to that period, in different depositories, subject to the orders of the canal commissioners, amounting to

\$909,470 56

The abstracts since received from the Banks authorized to pay, on checks of the acting commissioners, show an actual payment as follows, viz:

By the Western Reserve Bank, up to the 25th of November, 1825, on contracts for work, 59,718 00

During the same period, for contingencies, 2,920 00

the sum of 20 00

To same for collecting a draft on the Treasury, 62,658 00

By the same Bank, there has been paid from the 25th of November, 1825, to the 25th of November, 1826, on the checks of the acting commissioner for work on contract, 340,737 46

By the same Bank during the same period, for contingencies, 10,544 10 351,281 56

By the Lancaster Ohio Bank, up to 31st December, 1825, as per Bank abstract of that date, there had been paid on checks of the acting commissioner, for work on contract, 39,847 00

By the same Bank, during the same period, for contingencies, 1,000 00

Ditto, for expenses canal commissioners on order of the president, 100 12

41,007 12¹/₂

By the same Bank there has been paid since 31st December, 1825, up to the 12th Decem-

per, 1826, per Bank abstracts of that date, the checks of the acting commissioner, for work done on contracts, the sum of 336,202 01

By the same Bank during the same period, on checks of the acting commissioner, there has been paid for contingencies, 11,936 91

By the same Bank, within the same period, for expenses of the canal commissioners, on the orders of the president, 171 80

348,310 72

There has been paid by the Bank of Columbus, as per their abstract of December 19, 1825, on the checks of the acting commissioners, for work done on contract up to that date, the sum of 13,987 00

By the same during the same period, for contingencies, 3,800 00

17,787 00

By the same since the 19th of December, 1825, as per their abstract of January 2, 1827, for labor on contract, 2,013 00

By the same during the same time, for contingencies, 884 72

2,897 72

There has been paid by the Bank of Marietta, as per Bank abstract of November 13, 1826, on the acting commissioner's checks, for work on contract, the sum of 10,000 00

There has been repaid to the Bank of Marietta, as per Bank account, of November 16, temporary loan and interest, 10,225 00

20,225 00

In addition to the above payments, made through our agents the Banks in Ohio, we have paid as per our former statement to the board of canal commissioners, by an order on the treasury, in February, 1825, the sum of 3,000 00

To the commissioners of the canal fund, their expenses of 1825, per statement of 1825, 591 30

Interest on the 5 per cent. loan of 1825, as per Manhattan Bank account, 7,511 45

Ditto, on temporary loan of Lewis Cass, 123 75

Ditto, ditto, of E. Buckingham jr. & Co. 32 34

Paid to the commissioners of the canal fund, and accounted for below, 1,302 00

12,560 84

Making a sum total of payments from the canal fund, as per abstracts of the Banks, our agents for making payments, of

856,727 96

To which add balance in the Western Reserve Bank, applicable to payment of labor on contracts as per Bank abstract, of November 25, 1826, 46,524 54

Balance in same Bank, as per same abstract applicable to contingencies, 1,535 90

To which add balance remaining in the Lancaster Ohio Bank, applicable to payment of work on contract, as per Bank abstract of the 12th of December, 1826,

950 90

Balance in same Bank, as per same abstract, for contingencies,

3,063 00

In same, as per same abstract, balance applicable to payment of the expenses of the canal commissioners, subject to the order of their president,

663 07

52,742 50

Which balances were remaining in the several Banks, unexpended at the dates of the several abstracts above stated. To this add error in ascertaining the amount drawn from the fund

10

909,470 56

The present exhibit of expenditures is made up, as above mentioned, from the abstracts furnished by the Banks making payment, and if any difficulty should be experienced in reconciling it with our report of 1825, taken from the abstracts of the acting commissioners it will arise from the circumstance that the commissioner's abstracts shew many more checks drawn, than the Bank abstracts shew to have been paid. The checks, no doubt, remaining in the hands of contractors, engineers, &c. and not presented for payment, when the Bank abstracts were made up.

Of the sum put into hands of the commissioners of the fund, as above stated, for expenses,

1,302 00

E. A. Brown has received the sum of 700 00

And furnished an account of the expenditure of

542 00

Leaving in his hands a balance of 158 00

E. Buckingham has received of the same fund, 402 00

And has furnished an account of expenses, amounting to

415 43

And S. Sturges' bill for clerk hire, 50 00

465 43

Simon Perkins has received of the same fund, 200 00

And stated his expenses to have been

163 11²/₂

Leaving in his hands an unexpended balance of

36 38¹/₂1,168 11¹/₂

In our report of the 11th of December, we state an undrawn balance of the canal fund, amounting to

598,612 39

This should be increased by correcting an error in our former statement, in subtracting the amount received prior to the 21st of September, from the whole amount of the loan of 1826, of

10,000 01

Making a total balance undrawn at that date of

608,612 40

Of this sum there was in the Manhattan Bank, at the date of our last report,

194,973 40

Balance of the loan of 1826, remaining unpaid, September 21, 413,634 00

Making, together, an undrawn balance above stated, of 608,612 40

The unexpended balance, in the Banks of Lancaster, and the Western Reserve, appears by their abstracts above stated, to be 52,742 50

On this balance, the acting commissioners, as per their abstracts, have drawn checks, which had not been presented, when the Bank abstracts were made out, for the following sums, viz:

By A. Kelley, for payment of work on contract,	9,846 75
By same, for contingencies,	650 00
By M. T. Williams, in payment for work on contract,	13,232 65
By same for contingencies,	980 00
	<u>24,709 40</u>

Which taken from balance remaining in Banks, leaves 28,033 19

Which added to the undrawn fund above stated, makes a grand total unexpended of 636,645 59

From this last mentioned sum, the deductions, mentioned in our former report, should be made, viz:

Repayment to the Lancaster Bank, loan and interest,	30,825 00
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And an estimated interest, on the loans of 1825 and 1826, due on the first instant,	37,000 00
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It may be proper here to remark, that on the first of July next, a semi annual interest will be due on the loan of 1825, of	10,000 00
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Same on six per cent. loan of 1826, estimated at	30,000 00
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And on the first of January 1828, a like sum of	40,000 00
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147,825 00

From which sum, deduct the canal tax of 1826, estimated at	22,000 00
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125,825 00

And this sum \$125,825, subtracted from the above grand total, will leave a balance for future canal operations, estimated at

\$510,820 59

The canal commissioners estimate that this sum will meet the balances now due to contractors, and continue the operations until July, before which time, a new loan must be contracted. The law at present authorizes a loan of 1,200,000 dollars, in 1827; which is believed to be as much as can be economically expended, in twelve months.

In their late report, the commissioners observed, that by their agreement with the Manhattan Company, an annual statement of their accounts with that Bank might be expected in January. That account has not been furnished, nor can it reasonably be looked for, until about the middle of this month; but as it could only be serviceable, in this report, to enable the commissioners to ascertain the amount paid in, on the loan of 1826, subsequent to the 21st of September; and to ascertain the precise amount of interest payable on the first instant; and the sum placed to the credit of the fund for interest on account of deposits, they thought it would not be advisable to withhold this communication, for want of that account.

The commissioners take this occasion, respectfully to suggest, to the Legislature, the great difficulty of complying with the provisions of a law of last session requiring quarterly returns to the Auditor's office. The distance of the Banks, acting as our agents, from the residence of either of the commissioners, and the difficulty of obtaining accounts punctually, as also the remoteness of the acting commissioners, and the various operations under their superintendence, (if conducted with needful care and vigilance,) will, as they inform us, make it impossible for them to complete the abstracts of the operations of any one quarter, in less than four to six weeks from its close. These obstacles, joined to the great distance the commissioners of the fund reside apart, and the frequent necessity of occasional absence, for weeks and months from home in attending to the high trust confided to them, seem almost to preclude the possibility of complying with the law, by a satisfactory report, at the end of every three months.

The commissioners submit the following recapitulation and estimates, in relation to the subject of interest:

Interest on five per cent. loan for 1825	\$7,511 45	
Ditto on same, for 1826,	20,000 00	
Ditto on temporary loan for 1826,	1,206 09	
Estimated interest on six per cent. loan for 1826,	17,000 00	
	<hr/>	45,717 54
Interest on five per cent. loan for 1827,	20,000 00	
Ditto on six per cent. loan for 1827,	60,000 00	
Estimated interest on contemplated loan for 1827,	36,000 00	
	<hr/>	116,000 00
Estimated amount, up to the first of January, 1828,		161,717 54
The provision to meet these charges, consists of different appropriations from the treasury, in 1825; to be applied to the payment of interest; amounting to	70,000 00	
And the estimated proceeds of the tax of 1826,	22,000 00	
	<hr/>	92,000 00
The amount to be provided for the interest of 1827, being		<u>\$69,717 54</u>

It will be remembered, that the present collection law does not contemplate the receipt of the annual tax, till the month of January; while the semi-annual interest, on our loans, is payable on the first of July and January. The commissioners ask leave to direct the attention of the Legislature, to the operation of this circumstance on the interest account, in future: the fund

heretofore provided, in anticipation of accruing interest, being finally absorbed, in the calculation for the current year. These considerations joined to the uncertainty of the amount, have caused the omission of interest from deposits from the statement of means for 1827. Prudence seemed also to require, that any probable income from the canals should, in like manner, be omitted, for the same reasons; as well as because unforeseen contingencies may attend our next loan; and because several items of the last mentioned statement are upon estimate. The increased appropriations will enable the canal commissioners to commence the receipt of tolls, a year sooner than was contemplated in their report of 1825. The estimates of revenue, in that report, require no comment, at present from the commissioners of the fund. The same may be said of the views, on the subject of interest, contained in that document; except that the calculations were founded on a much smaller annual expenditure, than has since been authorized.

ETHAN A. BROWN,
E. BUCKINGHAM,

January 4, 1827.

REPORT,

Of the Finance Committee of the House of Representatives, 15th Jan. 1827.

The committee of finance, to whom was referred the accounts of the commissioners of the canal fund, and so much of the report of the canal commissioners as relates to their accounts, have attended to the duties assigned them, and ask leave to report:

That the commissioners of the canal fund are chargeable with two appropriations from the Treasury of State, which were paid in the year 1825,

43,000 00

The nett proceeds of a permanent loan obtained in the year 1825,

390,000 00

Temporary loans from the Banks at Marietta and Lancaster in 1826,

40,000 00

An appropriation from the revenue of the year 1825, which is paid,

30,000 00

Permanent loan of 1826, (of which a part say 100,000 dollars is not yet paid.)

1,000,000 00

Premium on ditto

8,474 76

Interest on deposits in Manhattan Company, January 1st, 1826,

6,608 20

\$1,518,082 96

That said commissioners have made payments from said fund for work on the canals in 1825 by A. Kelley, acting commissioner,

59,71 00

Ditto ditto M. T. Williams,

53,834 00

Ditto ditto 1826, A. Kelley,

340,737 46

Ditto ditto do. M. T. Williams,

348,215 01

\$802,504 47

And that payments have been made for contingencies by the Banks in 1825, to A. Kelley, checks,

2,920

Do. do. M. T. Williams, do.

4,800

By Isaac Minor, president, &c. to A. Kelley's order,

1,000

Do. do. M. T. Williams' do.	1,340	
By Isaac Minor, president of board of canal commissioners disbursed and accounted for,	660	
	<u>10,720</u>	
Paid by the Banks in 1826, to A. Kelley, checks,	10,544	10
Paid by the Banks in 1826 to M. T. Williams' checks,	12,821	63
	<u>23,365</u>	73
		<u>34,085 73</u>
Paid expenses of board of canal commissioners,	331	92
Paid expenses of fund commissioners 1825,	591	30
Fund commissioners have drawn for themselves for expenses in the year 1826,	1,302	00
	<u>1 893</u>	30
		<u>2,225 22</u>
Paid Western Reserve Bank for collecting draft 1825,		20 00
Paid the Bank of Marietta, temporary loan,		10,000 00
Paid interest on loan in New York,	7,511	45
Ditto Lewis Cass & E. Buckingham, jr. & Co.	156	09
Ditto Bank of Marietta, on temporary loan,	225	00
	<u>7,892</u>	54
Whole amount of disbursements actually paid out is		856,727 96
And which deducted from the amount received by the commissioners, leaves a balance of		<u>661,355 00</u>
Which said balance is deposited as follows:		
In the Lancaster Ohio Bank,		4,682 15
In the Western Reserve Bank,		43,060 44
As appears by the accounts rendered said Banks, and by		
In the Manhattan Company, New York,		608,612 41
		<u>661 355 00</u>

Which said sum includes the balance of the permanent loan yet unpaid to said company, as appears by an account rendered by the Manhattan Company in November last; the commissioners exhibited to the committee the following statement of the above \$1,302, drawn for their personal expenses, viz:

Ethan A. Brown paid for printing blanks and advertising for loans per vouchers,	107	01
Ditto personal expenses,	434	99
Ebenezer Buckingham. Clerk hire and books, blanks, per vouchers,	74	69
Ditto personal expenses,	390	74
Simon Perkins, personal expenses,	163	1
Balance unexpended,	131	46
	<u>1,302</u>	00

The foregoing payments for work done, to the amount of \$802,504 47 is evidenced by the abstracts of the accounts of the Banks, which have paid the same, together with the checks of the acting canal commissioners received, and each check accompanied with a certificate of a resident engi-

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY, BY JOHN KILBOURN, AT \$3 A YEAR, IN ADVANCE.

VOL. I. COLUMBUS, OHIO, SATURDAY, OCT. 11, 1828. NO. 17.

Readers will notice that the Ohio Canal documents are continued on the third page of every number, from the last page of the preceding number.

In our last number, an article from the New York Statesman, was inadvertently omitted being credited to the proper source. We intend to be scrupulously careful in giving due credit.

THE MECHANIC.

If the dignity of things may be measured by their importance to mankind, there is nothing perhaps, which can rank above the Mechanic Arts. In fact, they may be called the lever, fulcrum, and the power, which moves the world. They do not want the "whereon to stand" of Archimedes: they have a sufficient foundation in themselves.

What gives to civil nations their superiority over the savage? It is chiefly Mechanic Arts. By them the beautiful and convenient mansion is substituted for the rude and uncomfortable hut; and "scarlet and fine twined linen" supply the wardrobe, in place of skins of wild animals. They are the foundation of nearly all the improvements and comforts of life, and further, we may say, of the glory and the grandeur of the world. By them the farmer ploughs land, and by them the mariner ploughs the ocean; by them the monarch is adorned with his crown; and by them the peasant is clad in comfortable garments; by them the triumphal arch is raised to the hero; and by them the temple ascends to the Deity; by them the wealthy roll in chariots and loll on couches; by them the table is spread, the bed is decked, and the parlor is furnished. To them the poet owes the perpetuation of his fame. Homer sings and Caesar triumphs in all ages. Through them we are instructed by the wisdom of Plato, and charmed by the eloquence of Cicero; through them we admire the justice of Aristides and the heroism of Leonidas.

And much of this is owing to the two single arts, that of printing, and the manufacture of paper. By the former, learning has been rescued from the gloom of the dark ages; but without the latter, the benefit of printing would be circumscribed to very narrow bounds. It is by means of the press chiefly, that so much of Christendom owes its escape from the thralldom of superstition.

But in speaking of the dignity of the Mechanic Arts, we could not confine them to the mere hand that executes, without thinking of the head that plans; for without the latter but little more credit would be due to the person who exercises these arts than to the automaton Turk, who mechanically astonishes the

world at the game of chess. To produce the great effects we have mentioned above, to do so much to enlighten, to beautify and improve the world, to labor for the glory and happiness of others, and yet be ignorant of the springs by which the important movements are carried on, would ill comport with the dignity of the mechanic. He would be ("if we may compare small things with great") like the sun in the heavens, which renders light and warmth, and comfort to mankind, without itself being conscious thereof.

There is a philanthropy in the Mechanic Arts. The mechanic who brings to his occupation an inventive, enlightened, and enquiring mind, who is master of his craft, in theory as well as in practice, has more of real philosophy, in him than twenty of those minute philosophers who spend their lives in puzzling the world with empty metaphysical speculations, and of whom Cicero speaks with so much deserved contempt. The mechanic who perfectly understands his trade, as well in the principle as the practice of it, gets himself a degree of no inconsiderable rank and honor, and that without the intervention of a college, or the formal vote of a learned corporation. To become an ingenious and enlightened mechanic, it is necessary that the youth who is destined for a trade, should bring to his employment a mind inquisitive, studious, busy, and inclined to mechanic pursuits. Such a mind, with ordinary attention to its cultivation can scarcely fail of being in a very considerable degree enlightened. But to the common sources of information, a good many mechanics add a very laudable attention to books, to the periodical publications of the day, and to the associations for mutual improvement. Mechanics' and apprentices' libraries are established, and mechanics' societies are formed, which by inducing studious habits, interchange of ideas, and collision of sentiments, most tend to improve the minds of the members in a high degree. There is in fact, at the present time, a very large share of information and solid practical knowledge among the mechanics of this country.

The life of the mechanic, it is true, is a life of labor; and while he wipes the sweat from his brow, he may perhaps murmur at his fate, and envy what he considers the easy lot of the other professions. But here is the business which exempts a man from a life of labor? The life of a judge, and of the first officer under government is a life of labor. But can these "honorable men" build a ship, or raise a snare to heaven, or exercise all or any of the arts which add so much to the comfort and grandeur of the world? These the mechanic can do; and if he duly reflects on the importance of his labors, he can scarcely regret at his lot.—*Berkshire American*.

IMPORTANT INVENTION.

We this morning examined and saw in operation a most ingenious and valuable machine for spinning flax and hemp, invented by Dr. Bell and Mr. Dyer, two intelligent and highly respectable gentlemen from New England.—They entered upon the prosecution of their plans last winter, and have now brought them to a successful termination. As the patent has not been secured, we are not permitted to give a full description of the invention; but the following particulars will be interesting to our readers, especially to those who wish well to the cause of American manufactures.

This machine is constructed on an entirely new principle, having no analogy to the processes for the cotton, woollen, worsted, or other manufacture. The quality of the yarns produced is pronounced by competent judges, to surpass other linen yarns in as great a proportion as cotton or woollen yarns spun by the present improved machinery, are superior to those wrought by hand. The size of the thread can be varied to any extent, from that of cambric to that of rope yarns used in the manufacture of cordage. In the degree of velocity, its operation is limited only by the quickness which the spindles and fliers are capable of supporting. The instrument now in operation produces about the same quantity of thread per spindle, fineness being equal, as the *throstle spindles* in the cotton manufacture. The whole formation of the thread from dressed flax is completed at one operation. The material laid on the machine is wound upon the spools ready for the loom, without the intervention of any assistance; the whole being effected by the rotatory motion communicated from drums. Indeed, all the motions of the instrument are of a circular kind.

So far as our observation or knowledge extends, this invention is entirely original, and nothing of the kind exists in the workshops of the United States or Europe, where fabrics from flax are entirely wrought by hand. The manufacturers of linens will now be placed upon the same ground and enjoy the same facilities as cottons. It has been estimated, that upon moderate calculations, *two millions of dollars* may be saved annually to this country, by the reduced expense of linen fabrics, effected by this invention. If it be not introduced abroad, and foreign prices thus diminished, the products of our looms will supply our markets and prevent importations from maintaining competition. Such is our impression of the importance of this machine. Those who are incredulous on the subject, may have their doubts removed by an examination of specimens of thread at this office, or by inspecting the machine at the corner of Pine and Water streets.—*N. Y. Statesman*

Canal Commerce.—Two hundred tons of merchandise were received at our wharves, by the Erie Canal, during the last week, destined for Michigan Territory and the states of Pennsylvania, Ohio, Indiana and Illinois. This was exclusive of the supplies for our own village and of the immense quantities of salt, amounting to many hundred barrels which arrived during the same period. Such are the

facilities of conveyance up the lake, that this quantity of goods, extensive as it is will meet with no delay here, as thirty-four sail of vessels were in port on Friday last, receiving cargoes, or ready for sea. Such is among the consequences of the Erie Canal, the enlivening influences of which are still extending west, and are already felt even upon the shores of the Mississippi.—*Buffalo Journal of Sept. 30.*

PERIODICAL LITERATURE.

THE editor and publisher of this paper is duly authorized to receive subscriptions, and to receipt for all moneys therefor, for the following works, published quarterly, each, at \$5 a year in advance, namely:

North American Review,
American Quarterly Review,
American Journal of the Medical Sciences.

—Also—

The following monthly publications, at \$5 a year in advance, namely:

Museum of Foreign Literature,
Journal of Foreign Medicine,
Religious Magazine.

—Likewise—

Franklin Journal and Mechanics Magazine,
at \$5 a year, in advance.

All the abovementioned works are published in Philadelphia; excepting the *North American Review*, which is published in Boston.

—Likewise—

The Western Monthly Review,
Published in Cincinnati, at \$3 a year.
Columbus, Ohio, Sept. 1828

OHIO MAPS.

The editor of this paper has just revised his Maps of the state of Ohio,—one large, upon the scale of 10 miles to an inch;—the other small, being drawn upon a scale of 40 miles to the inch; so that it is but little more than six inches square. It is beautifully engraved, and printed on bank note paper. Price 18 cents; or 12 cents if several are taken together.—Price of the larger ones \$1 50 each; or one dollar if several are purchased together. The canal routes are correctly delineated on both.

OHIO CANAL.

PROPOSALS will be received on the 14th day of November next, at Lancaster, for the construction of *Forty-three miles of Canal*, lying between the Licking Summit and Circleville.

Twenty-eight to thirty Locks, with two Aqueducts and a Dam across Walnut creek, are included in the work to be let.

Bidders, who are unknown as Contractors, to the Acting Commissioner, will be expected to accompany their propositions with recommendations of a substantial and unquestionable character.

Plans and specifications of the work may be seen at the office in Lancaster at any time after the 10th of November.

M. T. WILLIAMS,
Acting Commissioner.

Oct. 10, 1828.

neer that work to the amount of the check had been done, so far as those checks have come to hand; the checks and certificates paid by the Western Reserve Bank not having come to hand when your committee finished their examinations, said payments are likewise proven by duplicates of receipts for each payment returned by the acting commissioners, signed by the contractors or their agents in whose favor the check was originally drawn. The amount above charged for contingencies, through the acting canal commissioners, is likewise warranted by the abstracts of payments made by the Banks, the checks drawn therefor by the acting canal commissioners and received, as well as the receipts and vouchers of the persons entitled thereto, returned by said canal commissioners—the residue of the charges to said fund are warranted by accounts and vouchers of the persons concerned—in closing this part of their report, your committee consider it due to the commissioners of the canal fund, the board of canal commissioners and acting commissioners to state, that, in the administration of the fiscal concerns and the construction of the canals, the mode of keeping the funds in New York, and transmitting them from thence to pay contractors and other expenses incidental to the construction of their works, all those precautionary measures have been adopted, which are necessary to secure to the state a faithful application of the funds provided for these objects; that system and economy have been observed in the expenditures, and that the mode adopted for keeping the accounts is well calculated to insure correctness in all the details, while it provides checks for the detection of errors, if any should be committed.

Your committee further report that they have examined the accounts of the canal commissioners, and have ascertained,

That Alfred Kelley has paid for work on contracts since their last report up to the first day of Dec. last, to the amount of 348,023 49

And that during the same time M. T. Williams has paid for work on contracts, 349,304 66

\$697,328 15

That since their report in the year 1825, up to the first day of December last, Alfred Kelley, acting canal commissioner, has paid out for contingencies, viz:

For wages of hands and salaries of engineers, &c.	7,299 00
For subsistence for the same,	3,438 91
For incidental expenses,	854 99

11,592 90

M. T. Williams for contingencies, viz:

For wages of hands, salaries of engineers, and commissioner,	8,481 69
For subsistence of hands & engineers,	3,279 29
For incidental expenses,	1,226 05

12,987 03

24,579 93

Total amount of payments up to December 1st, 1826, since last report, 721 908 08

To which said amounts said commissioners have returned the receipts of contractors for checks on Banks, for the amount paid on contracts, and for the amount of contingencies paid as above specified, said commissioners have furnished the accounts and bills of engineers and hands employed, and bills of particulars of other persons, all receipted as received of said acting canal commissioners, all of which vouchers were by your committee compared with the charges to which they respectively refer.

To the above amount paid out upon contracts in 1826, viz:	697,328 15
Add the amount as reported in December, 1825:	
By Alfred Kelley, acting commissioner,	63,279 00
By M. T. Williams, ditto,	55,577 00
	<hr/>
	118 856 00
	<hr/>
	816,184 15

To which sum add contingent expenses as then reported,	11,832 87
And the contingent expenses for 1826,	24,279 93
	<hr/>
	36,412 80

Total amount of checks and orders drawn by the acting canal commissioners,	<hr/>
	\$852,596 95

From which sum deduct amount of checks drawn by the acting canal commissioners on the Banks, as agents of the fund commissioners and paid by them as per their accounts rendered,	
	336,590 20
	<hr/>
	\$16,006 75

Which leaves the sum of \$16,006 75, receipted to said acting commissioners, consisting principally of checks drawn upon the said Banks acting as the paying agents of the commissioners of the canal fund, and not presented for payment by the holders thereof, at the time said Banks rendered their respective accounts, which sum will be charged to the commissioners of the canal fund as soon as the Banks shall have made payment thereof.

REPORT,

*Of the Canal Committee of the House of Representatives, concerning damages,
18th January, 1827.*

The standing committee on canals, to whom was referred the memorial of sundry citizens residents of the Miami country, praying for an alteration of the law prescribing the mode for the assessment of damages for materials, &c. taken for the construction of canals, have had the same under consideration, and ask leave to report:

That the provisions of the present existing laws, in relation to materials taken for the construction of canals, do not in all cases administer equal and exact justice between the state and the various persons whose rights are affected by the making of the canals, and in some instances, hardship to one individual may grow out of the principles established by the law, when his case is compared with that of others. The land, or materials necessary for the making of the canal, belonging to one person may be taken for that purpose, and yet the law will give him no compensation, because it considers the benefit conferred on the property of the same person, far more than an equivalent for the damage done; while his neighbor receives perhaps an equal benefit, and sustains no damage in the occupation of part of his ground or in the use of part of his materials. This seeming, and in some instances, real inequality, results from the nature of the case, and is difficult to be remedied, without producing a greater evil; and when it is considered that no positive injury is on the whole done to him whose materials are taken for public use, by taking into view the benefit accruing to him, as a set off to the damage done, but only that he is not benefitted as much as his neighbor, it is not certain that justice requires a remedy, or that greater injustice would not be done by attempting it.

To give to every individual through whose land the canal may run, or from whose possession materials may be taken for the construction of the canal the full value of the land or materials so taken, although his property may be benefited to ten times the amount, would do great injustice to those whose property is situated so remote from the canal, as to receive much less benefit from its construction, but who would nevertheless be compelled to contribute a portion of the allowance so made for damages. The principles of the law as it now stands, in relation to damages claimed for land or materials taken for the use of the canal, are the same that have long been established in regard to land or materials taken for the making of roads, and no good reason can be assigned for adopting different rules in cases so analogous.

It is urged, that before any material is taken for the use of the canal, the damages which will result to the owner, from the taking of such materials should be assessed and paid; and this course at first view seeming just and reasonable, but on a careful investigation, it will be found to involve many difficulties, and to produce much embarrassment and uncertainty. It is frequently impossible to determine beforehand, the amount of materials which may be taken from any particular place, or the value of those materials. A stone quarry, for instance, may prove to be so abundant, that the value of each perch may be reduced to a mere trifle, and the benefit to the owner, from the discovery and opening of the quarry, be greater than the damage done by taking a part; and on the other hand, it may prove to be of so small extent, and so difficult to open as to induce its abandonment, when but a few perches have been taken. It will in all cases be impossible to determine the relative amount of benefit accruing from the making of the canal, compared with the damage sustained by the taking of materials for its construction, until the amount of those materials shall be ascertained; and of course the validity of the claimant's right to any damages whatever, under the provisions of the law, cannot in all cases be determined before the amount and value of the materials can be known.

To preserve something like uniformity in the rules to be adopted in the appraisal of damages in different sections of the country, and among different claimants, it seems important that the same board should assess the damages on a considerable extent of line; and to call on this board in every instance and at all times where it may be found necessary to take materials for the use of the canal, of however small amount, would frequently be attended with more expense than the whole value of the materials taken, and would greatly injure the progress of the work, by calling off the attention of the acting commissioner or engineer from more important duties. On the other hand it is believed that no serious injury can result to the owner of materials taken for the use of the canals, from waiting for his compensation, if he be entitled to any, until the full amount and value of the materials taken, and the benefit likely to result from the canal can be fairly ascertained. For it will be observed that these materials are generally unproductive property and such as are not required for immediate use by the owner.

To prevent the commissioners or their agents from entering on lands or taking materials necessary for the construction of the canals, until the owners will consent to such occupation, or agree upon the terms on which it may be done, would be placing the whole project at the mercy of every person, who might happen to be the owner of land or materials necessary to be used in the work.

In order to prevent as far as possible a recurrence of the troubles and difficulties, which have been produced by the taking of materials under the authority of the provisions of the law above referred to, it may be advisable in contracts hereafter to be made, to require the contractors, to procure the necessary materials at their own expense, without having recourse to the au-

thority given by the statute except in cases where the materials necessary to be used in the construction of the canal, cannot be obtained from the owners on any terms, or can only be procured for exorbitant prices; in which cases the acting commissioner will cause the materials to be taken and the damages assessed under the provisions of the law, the contractor paying the amount so assessed. If contractors receive due notice of such a regulation, before putting in proposals for jobs, they can regulate their prices accordingly, and no injustice will be done to them.

Even under existing contracts the contractor may be authorized by the acting commissioner to purchase the necessary materials wherever they can be procured at fair prices, allowing him on settlement the value of the materials in a state of nature.

It is possible, and perhaps probable, that either of these methods, while it would avoid many disputes and difficulties which would otherwise occur, would add something to the expense of the work. The experiment may, however, be tried without serious injury, and if found beneficial may be pursued, or some other plan adopted to effect the same desirable object.

From every consideration we are able to give the subject, it is however deemed inexpedient to provide by law that the full value of the materials taken for the use of the canals, shall in all cases be paid to the owner, without taking into view the benefit his property will receive from the canals; or that the materials shall be appraised and paid for, before they may be taken for use. These provisions would tend greatly to embarrass the work on the canals, and to enhance its expense, as well as to produce manifest injustice and encourage a dishonorable cupidity.

Therefore, your committee recommend the adoption of the following resolution:

Resolved, That it is inexpedient at this time, to make any change in the eighth section of the act, entitled "An act to provide for the Internal Improvements of the state of Ohio by navigable canals."

January 18, 1827.

REPORT,

Of the Canal Committee of the Senate, 18th January, 1827.

The committee upon Canals, to whom was referred the reports of the Canal Commissioners, and the Commissioners of the Canal Fund, with instructions in relation to the receipts and expenditures of the Canal Fund, and other objects therewith connected, have given to the several subjects submitted to their consideration, all the examination which their high importance demands; and have come to the conclusion, in relation to the time fixed by law for the Canal Commissioners to make their annual report, that the benefits arising from their report being made at an earlier period than is now required, would not be equivalent to the inconveniencies and embarrassments which would result from a change of the mode of accounting now established by the Board of Canal Commissioners, in connection with the Fund Commissioners, which must necessarily be more or less affected by the time at which they are required to report. The committee have also inquired into the manner in which payments have been made upon contracts for labor and materials, and the frauds which are said to have been practised by contractors upon the persons under their employ.

On the Miami Canal, and at the Licking Summit, on the Ohio Canal, the payments for labor and materials, have principally been made by the Acting

Canal Commissioner, in checks drawn upon the Lancaster Bank, and those on the northern section of the Ohio Canal, in checks drawn upon the Western Reserve Bank, in pursuance of arrangements made with those Banks, by the Commissioners of the Canal Fund. No inconvenience has been experienced by the contractors or laborers employed upon the northern section of the Ohio Canal, in consequence of a depreciation in the currency in which payments on that section have been made; the paper of the Western Reserve Bank, has, as far as the committee have been able to ascertain, uniformly sustained its par value, in that section of country where it has been expended for Canal purposes; and when specie or other funds have been required by the holders of checks upon that Bank, or upon the Bank of Lancaster, they have in no instance been withheld. On the Miami Canal, there has been some complaint, in consequence of the paper of the Bank of Lancaster, in which payments on that line have principally been made, having been subject to a discount of from one to two and a half per cent. This evil seems to have originated in part, from the remote location of that Bank from the Canal line, but principally from the intimate connection of the commercial and banking interests of the city of Cincinnati, with all monied transactions in its vicinity. The great amount of capital in that city under the immediate direction of its bankers and brokers, gives a controlling influence to the interests of that capital which is not within the reach of Legislative provision. The evil is, not, in the opinion of the committee, of sufficient importance to justify a transfer of the funds applicable to the payment of contracts upon that line of Canal, from the Bank of Lancaster to any other institution, especially when it is a fact admitted that that Bank, in common with the Western Reserve Bank and others through which the Canal Funds have been transmitted, has hitherto been, and is still willing to afford every possible facility, to the accomplishment of the grand object of internal improvement which could be expected or wished by the state. The Acting Canal Commissioners, in the last contracts which have been entered into, have required of the immediate contractors under the state, their personal superintendence of those parts of the line included in their contracts, and retain the power of withholding payment in all cases, until the completion of the work contracted for, and also in most cases of making payments to the sub-contractors and laborers, when their claims shall have been substantiated, and of applying the payments so made upon the original contracts. It is also contemplated by the Commissioners of the Canal Fund, to provide, through the agency of the Banks which now transact the business, for the payment of the contracts upon the Canal lines, and in such funds as will pass at par value, as far as that object can be effected without an unreasonable sacrifice of the interests of the state to individual convenience. The first of these arrangements will place in the power of the Acting Canal Commissioners, to control the payments to contractors in all cases where an intention to defraud is suspected, or can fairly be inferred from the conduct of the contractor, and the second will render it extremely difficult for contractors to abscond after payments have been made to them, without having first satisfied the claims of the laborers employed by them, and if carried fully into effect, will relieve the contractors and laborers from the difficulties and embarrassments consequent upon the receipt of the several amounts due them, in depreciated paper. These provisions, in the opinion of the committee, are abundantly sufficient to secure a prompt and faithful discharge of all engagements between contractors and laborers, and that no additional security can well be given by the interposition of Legislative authority.

The committee have, also, in obedience to the instructions of the Senate, examined the accounts and vouchers in relation to the receipts and expenditures of the Canal Fund, up to the first of December last, and find the fund to consist of the following items, viz:

Two appropriations from the Treasury in 1825,	\$43,000 00
An appropriation of the revenue of 1825,	30,000 00
Nett amount of the five per cent. loan of 1825,	390,000 00
Temporary loan from the Banks of Lancaster and Marietta, in 1826,	40,000 00
Permanent loan of 1826,	1,000,000 00
Premium on the loan of 1826,	8,474 76
Interest on deposits in the Manhattan Bank, up to January 1st, 1826,	6,608 20

Making the aggregate amount of

\$1,518,082 96

To which amount should be added the probable amount of interest on deposits in the Manhattan Bank, up to January 1st, 1827, say

14,000 00

And the estimated amount of the Canal tax of 1826, which will have been received during the present month,

26,000 00

40,000 00

1,558,082 96

Making the sum of

Which constitutes the whole amount of the Canal Fund, up to January 1, 1827—from which the following payments have been made:

On contracts in 1825, by A. Kelley, Acting Commissioner,	59,718 00
On contracts in 1825, by M. T. Williams, Acting Commissioner,	53,834 00
On contracts in 1826, by A. Kelley, Acting Commissioner,	340,737 46
On contracts in 1826, by M. T. Williams, Acting Commissioner,	348,215 01
For contingencies in 1825, by A. Kelley, Acting Commissioner,	2,920 00
For contingencies in 1825, by M. T. Williams, Acting Commissioner,	4,800 00
For contingencies in 1825, by Isaac Minor, President of the Canal Board, M. T. Williams and A. Kelley,	3,000 00
For contingencies in 1826, by A. Kelley,	10,544 10
“ do. “ do. by M. T. Williams,	12,821 63
Expenses of the Board of Canal Commissioners in 1825,	331 92
Expenses of the Fund Commissioners in 1825,	591 30
Drawn for expenses of Fund Commissioners in 1826,	1,302 00
Amount paid the Western Reserve Bank, for collecting a draft in 1825,	20 00
Temporary loan from the Bank of Marietta repaid,	10,000 00
Amount of interest paid on the above loan,	225 00

Amount paid Lewis Cass, interest on temporary loan,	123 75	
Amount paid E. Buckingham, jr. & Co interest on temporary loan,	32 34	
Amount of interest paid on the five per cent loan, up to January 1st, 1826,	<u>7,511 45</u>	
Amount of payments up to Dec. 1, 1826,		856,727 90
Deducted from the amount of the Canal Fund as above stated, leaves an unexpended balance of		<u>702,355 00</u>
The following sums have been drawn for upon the general Canal Fund, up to December 1, 1826, viz:		
Amount drawn for on contracts by A. Kelley, in 1825, as reported last session,	63,279 00	
By M. T. Williams, on contract same period,	55,577 00	
For contingencies, as reported last session,	11,832 87	
Amount on contracts by A. Kelley, in 1826,	348,023 49	
Amount on contracts by M. T. Williams in 1826,	349,304 66	
For contingencies by A. Kelley, in 1826, viz:		
Salaries and wages,	7,296 00	
Subsistence,	3,438 91	
Incidental expenses,	<u>857 99</u>	
		11,592 90
For contingencies by M. T. Williams, in 1826, viz:		
Salaries and wages,	8,481 69	
Subsistence,	3,279 29	
Incidental expenses,	<u>1,226 05</u>	
		12,987 09
Expenses of the Board of Canal Commissioners in 1825; the expenses of the Fund Commissioners in 1825 & '26, amount paid the Western Reserve Bank; and the account of the temporary loans and interest, as stated in the amount of payments,	<u>20,137 76</u>	
Amount drawn for upon the Fund,	872,734 71	
From which deduct the amount actually paid out as stated above,	<u>856,727 96</u>	
And there remains a balance of unredeemed checks, of		16,006 75
Which, deducted from the above unexpended balance, leaves the sum of		<u>685,348 25</u>
To which add the unexpended balance drawn by the Commissioners of the Canal Fund for expenses,		<u>131 46</u>
Making the aggregate amount unexpended,		<u>685,479 71</u>
This balance is chargeable with the payment of the temporary loan of thirty thousand dollars made by the Lancaster Bank to the Canal Fund, and the		

interest which shall have accrued upon it, and the interest upon the five and six per cent. loans of 1825 and '26, which became due upon the first of July last, and on the first of January 1827: the balance after the payment of those sums, will be applicable to future operations upon the Canals. It will be observed that the amount of the temporary loans from Lewis Cass and E. Buckingham jr. & Co. is not contained in the above statement, no data having been furnished by the Fund Commissioners, by which the committee were enabled to give the precise amount: the general results will not, however, be affected by the omission, as it is well understood that those loans have been repaid.

In the examination of the above expenditures, the committee have with much care and labor, compared the vouchers for each item contained in the account, and have no doubt of the accuracy of the statement above made: they are also well satisfied with the manner in which the accounts of the Acting Canal Commissioners and the Commissioners of the Canal Fund, have hitherto been kept; all of which is respectfully submitted.

AN ACT

To provide for the appointment of a Commissioner of the Canal Fund.

Sec. 1. *Be it enacted by the General Assembly of the state of Ohio, That Simon Perkins, of the county of Trumbull, be, and he is hereby, appointed a commissioner of the canal fund, to fill the vacancy occasioned by the expiration of his term of office; who shall hold his office for the term of six years from and after the fourth day of February next, and until his successor shall be appointed and qualified.*

EDWARD KING,

Speaker of the House of Representatives,

A. SHEPHERD,

Speaker of the Senate.

January 16, 1827.

AN ACT

To commute the punishment of certain convicts in the Penitentiary, for labor on the Columbus feeder of the Ohio Canal.

Sec. 1. *Be it enacted by the General Assembly of the state of Ohio, That so soon as that part of the Columbus feeder, designed to supply the Ohio canal which leads from the Scioto river, in a southern direction, towards the main line of said canal shall be prepared for excavation, it shall be lawful for the Governor to commute the punishment of such convicts as he may deem advisable, from close confinement in the penitentiary, to hard labor on the said Columbus feeder, or any other public work, according to the provisions herein contained.*

Sec. 2. *That those convicts whom the Governor may deem fit subjects for receiving the benefits of this act, and who are desirous of doing so, shall each sign a certificate in the presence of two witnesses, not convicts, who shall attest the same, in which the consent of the convict shall be given, to perform such part of his term of service on the said feeder, in lieu of performing the same in the penitentiary, as may be required of him; which certificate shall be countersigned by the keeper of the penitentiary, and by him filed with the secretary of state, which certificate shall at all times be received as evidence for or against such convict.*

Sec. 3. That it shall be lawful for the keeper of the penitentiary, to employ the convicts whose punishment is commuted as herein provided, upon receiving a certificate from the Governor, on the said Columbus feeder, at such times and places as he may direct, and under such rules and regulations as he may prescribe; and he shall have power to appoint such deputies and guards, to superintend such convicts while engaged in laboring on said feeder, not exceeding one to every fifteen convicts, as he may think necessary for the safe keeping and faithful employment of such convicts.

Sec. 4. That the keeper of the penitentiary is hereby authorized to procure such implements and tools, as may be necessary to employ those convicts, whose punishment is commuted under this act, and charge the same in his account.

Sec. 5. That the keeper of the penitentiary, shall incur no forfeiture for the escape of any convict, employed on said feeder while so employed, or while going to or returning from such employment, unless such escape should arise from the negligence of the keeper, his deputies or guards, any thing in the act, making provision for carrying into effect the act for the punishment of crimes, notwithstanding.

Sec. 6. That the convicts during the time of laboring on said feeder, shall be lodged within the walls of the penitentiary, and kept there during the time they are not employed on said feeder, at such labor as the keeper may direct; and the keeper shall have power to secure any convict, employed on said feeder, in such manner as he may deem necessary to prevent his escape, or to confine any convict to hard labor, within the walls of the penitentiary, whenever he shall see fit, notwithstanding such commutation.

Sec. 7. That every person who may hereafter be convicted of any offence, made punishable by the laws of this state by imprisonment in the penitentiary, shall, at the discretion of the Governor, and upon his order be kept at hard labor, during the term or any part thereof, for which he may be sentenced to imprisonment, by the court, under the direction of the keeper, his deputy or guards, in excavating and constructing any part of the Columbus feeder of the Ohio canal, agreeably to the foregoing provisions of this act.

EDWARD KING,

Speaker of the House of Representatives.

A. SHEPHERD,

Speaker of the Senate.

January 30, 1827.

AN ACT

Authorizing the Commissioners of the Canal Fund, to make a temporary loan.

Sec. 1. *Be it enacted by the General Assembly of the state of Ohio,* That the commissioners of the canal fund be, and they are hereby authorized, on behalf of this state, if they deem it expedient, to borrow of any individual or individuals, or body corporate in this state or elsewhere, in the year one thousand eight hundred and twenty-seven, any sum, not exceeding five hundred thousand dollars, for any time not exceeding two years, at such interest as they may deem expedient; which said moneys, so to be borrowed shall be repaid by said commissioners, with the first moneys which they may obtain on any permanent loan, made in pursuance of the laws of this state.

Sec. 2. That all moneys obtained by said commissioners, by virtue of this act, shall be by them paid out and expended agreeably to the provisions of

the act, to provide for the internal improvement of the state of Ohio, by navigable canals.

This act to take effect and be in force from and after the passage thereof.

EDWARD KING,

Speaker of the House of Representatives.

A. SHEPHERD,

Speaker of the Senate.

January 30, 1827.

AN ACT

Supplementary to an act, entitled "An act to provide for the preservation of the papers and documents relating to the Ohio Canals," and fixing the compensation of the Acting Canal Commissioners, and for other purposes."

Sec. 1. *Be it enacted by the General Assembly of the state of Ohio, That the acting canal commissioners shall each, hereafter, receive the sum of three dollars and fifty cents per day, for each and every day by either of them actually employed, in the discharge of the duties required of them by law; which compensation shall be in full for the services by them rendered, and for their travelling and personal expenses, any law or usage to the contrary notwithstanding.*

Sec. 2. *That there shall be allowed to the commissioners of the canal fund, and to the canal commissioners, other than the acting commissioners, their proper and necessary travelling and personal expenses, for the time necessarily employed in the discharge of the duties required of them by law; which expenses shall be settled and allowed by the auditor of state, and be paid upon his order by the commissioners of the canal fund, who shall take duplicate receipts therefor, one of which shall be deposited in the office of the auditor of state, on or before the first Monday of December, annually.*

Sec. 3. *That in case either of the canal commissioners, or commissioners of the canal fund, shall hereafter be elected to a seat in either branch of the Legislature, such election shall render his appointment as a member of either of said boards of commissioners, absolutely void from the time of such election, and his seat therein vacant, and the same shall be filled as other vacancies in said boards are by law required to be filled.*

Sec. 4. *That it shall be the duty of the commissioners of the canal fund, whenever they shall obtain or effect a loan for the purpose of constructing and completing the Ohio canals, or any of the works connected therewith, agreeably to law, forthwith to report to the auditor of state the amount of such loan, the terms and conditions upon which it was obtained, from whom obtained, and if deposited, the place where deposited, upon what conditions, and to whose order payable; and for all deposits, payments or disbursements made by the commissioners of the canal fund, they shall take duplicate receipts, one of which shall, on or before the first Monday of December, annually, be deposited in the office of the auditor of state.*

Sec. 5. *That it shall be the duty of the commissioners of the canal fund, on the first Monday of December, annually, or as soon thereafter as may be practicable, to report to the General Assembly the amount of loans obtained or effected, the amount drawn by them on appropriations, donations or other sources, the terms and conditions upon which such loan was obtained, and where deposited or how disposed of; if deposited in a bank, and on what conditions, and to whose order subject; if paid upon the checks or orders of the acting canal commissioners, the amount paid in each quarter ending on the first days of March, June, September and December, shall be separately*

stated, and also whether the same was paid on contracts or for contingencies; they shall also state what amount of interest, (if any) has or may become due during the current year, and the probable amount which may become due for the succeeding year, and the time when the same will become due.

Sec. 6. That the commissioners of the canal fund and the acting canal commissioners shall, on or before the first Monday of December, annually, deposite in the office of the auditor of state, one of their duplicate receipts, or an abstract of all moneys by them paid out for the preceeding year, and all other papers and documents relative to the receipts and disbursements of the canal fund, and all other papers and documents relative thereto, shall be filed and preserved by the secretary of the board of canal commissioners; and the reports, accounts and proceedings of the commissioners of the canal fund, the canal commissioners, and acting canal commissioners, shall at all times be subject to the inspection of the Governor and treasurer of state, or of any person or persons who may be appointed by the Governor for that purpose.

Sec. 7. That the act, entitled "An act fixing the compensation of the acting canal commissioners and for other purposes," passed February eighth, eighteen hundred and twenty-six, and so much of the second section of the act, entitled "An act to provide for the preservation of the papers and documents relating to the Ohio canals," passed February eighth, one thousand eight hundred and twenty-six, as requires the commissioners of the canal fund to report to the auditor of state, quarterly, be, and the same is hereby repealed.

EDWARD KING,

Speaker of the House of Representatives.

A. SHEPHERD,

Speaker of the Senate.

January 30, 1827.

Resolved by the General Assembly of the state of Ohio, That the board of canal commissioners, if they deem it expedient, are hereby authorized to make an examination of the Muskingum river, from its junction with the Ohio, at Marietta, to the most convenient place for a connection between the river and the Ohio canal, to ascertain the practicableness and mode of improving the navigation of said river, and make report of such examination to the next Legislature; and in making such examination, a survey and level of the river shall be taken, and the sites of the improvements and manner of making them fixed upon: Provided, That the counties of Muskingum, Morgan and Washington, shall furnish the necessary assistants in making such survey: And provided, That said examination shall not be made to the prejudice of the work in which the state is now engaged.

January 17, 1827.

Resolved by the General Assembly of the state of Ohio, That the board of canal commissioners be, and they are hereby, authorized, if they think it expedient, to cause examinations, surveys and estimates to be made, by a competent and skillful engineer, of the most eligible route for a canal, from the Portage summit of the Ohio canal, to the waters of the Mahoning river, thence down the valley of said river or near the same to the eastern boundary line of this state, and that they make report thereof to the Legislature, at their next annual session: Provided, That said examinations, surveys and estimates can be made without requiring the personal attendance of either of the

present acting canal commissioners, and without prejudice to the works in which the state is now engaged, by withdrawing therefrom any of the engineers necessarily employed therein; and the expenses attending such examination, survey and estimate shall be paid by the Pennsylvania and Ohio Canal Company.

January 29, 1827.

Extract from Governor Trimble's Message to the Legislature, 4th Dec. 1827.

The progress of the work justifies the expectation, that the Ohio canals will be completed for a sum within the estimate, and at a time within the period originally contemplated by their projectors. In addition to thirty-eight miles of the Erie and Ohio canal which has been navigated during the summer, several miles of unconnected sections have been finished, which, with that part of the work contracted to be completed within the year 1828, will make a continued line from the Lake south of 187 miles, which it is expected will be ready for navigation early in 1829. It is calculated that active operations will commence on the entire residue of this line early the next season, and there is much reason to hope the whole work will be completed in 1830.

The entire line of the Miami canal is under contract, to be finished by the first of June next. The lower section from Middletown to Cincinnati, (but from an accidental breach in one of the aqueducts) would have been ready for navigation early in November. The favorable terms upon which the recent loans were negotiated, may not be considered as the least important fact connected with this subject.

Notwithstanding there has been difficulties unforeseen to overcome, and accidents to repair that could not have been guarded against; yet it is believed, there has not been in any country a work of such magnitude as the Ohio canals, conducted with equal success.

The northern section of the Erie and Ohio canal, presenting the most difficult and expensive part of the line, was opened early in July last. On the 4th, the first boat descended from Akron, a beautiful village at the Portage summit, to Cleaveland. She was cheered in her passage by thousands of our delighted fellow citizens, who had assembled from the adjacent country at different points on the canal to witness the novel and interesting sight. The gentle descent of a boat of fifty tons burthen, from an eminence of 400 feet, consummating on the day of American Independence, the union between the waters of the north and the south, presented a scene grand beyond description; and could not but have awakened, in all who beheld it, feelings of the most exalted patriotism and devotion to the cause of Internal Improvements.

THIRD ANNUAL REPORT OF THE CANAL FUND COMMISSIONERS.

27th December, 1827.

TO THE GENERAL ASSEMBLY OF THE STATE OF OHIO:

The Commissioners of the Canal Fund, in compliance with the Act constituting their Board, respectfully Report:

That since their last communication to the General Assembly, they have contracted for loans, amounting to one million two hundred thousand dollars, agreeably to the authority vested in them; the debt bearing an annual interest of six per cent., payable half yearly in the city of New York, where the

Principal is redeemable at the pleasure of the state, after the year 1850; for which the commissioners have received an aggregate premium, amounting to seventy-seven thousand five hundred and eighty dollars, and sixty-seven cents.

The Commissioners respectfully submit the following state of the Fund, made up to the first instant.

Undrawn balance, as per Report to the last General Assembly,	\$247,915 87
Received for remainder of loan of 1826,	413,634 51
Received from Manhattan Company, interest on deposits, to January 1, 1827,	21,063 45
Received from Treasurer of Ohio,	71,506 67
Received for premiums on loans of 1827,	77,580 00
Received on account of principal of loans of 1827,	403,500 59
Received from W. G. Buckner, difference of interest,	104 10
Received from Collectors of Tolls,	827 10
	<hr/>
	\$1,236,132 46

Payments made by the Western Reserve Bank, in 1826, more than reported,	\$1,000 00
Payment made to Lancaster O. Bank, (temporary loan)	30,000 10
Payments to contractors on the Canals, viz:	
By the Lancaster Ohio Bank,	457,313 67
By the Western Reserve Bank,	304,202 17
Payment for contingent expenses, by Lancaster Ohio Bank,	19,449 52
Do. do. Western Reserve Bank,	20,519 50
Do. do. Expenses of Canal Commissioners,	492 98
Do. do. Awards for damages,	4,448 77
Do. do. Interest,	80,090 31
Do. do. Expenses for contingencies of the Fund,	319 79
Balance remaining,	318,295 75
	<hr/>

\$1,236,132 46

Of the balance remaining there is deposited,	
In the Manhattan Bank,	204,014 76
In the Lancaster Ohio Bank,	98,483 65
In the Western Reserve Bank,	14,665 89
In the hands of the Commissioners of the Canal Fund, (expenses)	1,131 45
	<hr/>
	\$318,295 75

In submitting estimates of receipts and expenditures for the year 1828 we remark, that a condition on which most of the loan of 1827 was contracted, stipulated that it should be paid by monthly instalments of ten per cent. beginning with December and ending with August, excepting ten per cent. paid at the time of contracting; the lenders having the privilege of paying at any time before the regular instalments fall due. The sum yet to be received for the loans of 1827, with the balance of money on hand, as stated in the foregoing part of this Report, are expected to be sufficient to continue operations on the Canals till next August.

By the provisions of existing laws, the Commissioners are authorized to borrow, during the year 1828, the sum of one million two hundred thousand dollars. What particular time of the year may be considered most favorable to contract for such loan, cannot now be determined.—This uncertainty, and that of the time when the payments on the loan contracted during the present year will be made, necessarily attach uncertainty to the amount of interest that will be chargeable upon the Fund during the year 1828.

On the 1st of January, 1828, there will be due to Stockholders,		
Interest on 5 per cent. stock of 1825,	\$10,000 00	
On 6 per cent stock of 1826,	30,000 00	
On a portion of the loans of 1827,	9,000 00	
	<hr/>	\$49,000 00
On the 1st of July, there will be due a like sum of	\$49,000 00	
On the 1st of July there will be due to Stockholders of the remainder of the loan of 1827, interest estimated at	30,000 00	
	<hr/>	79,000 00
Making a total of		<hr/> \$128,000 00 <hr/>

Whether any interest will be payable on loans that may be contracted during the year 1828, must depend on the time and conditions of the contract. The causes which operated favorably on the terms of the last loan, have had a contrary influence on our arrangement with the Manhattan Company; and we have been compelled to accept a less rate of interest, by one per cent. on our deposits.

Respectfully submitted,

ETHAN A. BROWN,
E. BUCKINGHAM,
SIMON PERKINS.

December 27, 1827.

SIXTH ANNUAL REPORT OF THE BOARD OF CANAL COMMISSIONERS.

17th January, 1827.

TO THE GENERAL ASSEMBLY OF THE STATE OF OHIO,

The board of canal commissioners, in obedience to the laws which define their duties, respectfully submit the following report:

In relation to the Ohio Canal.

At the date of the last annual report of the board, the work on that part of the Ohio canal which extends from the Portage summit to Cleveland, was in such a state of forwardness as to warrant the expectation that it might be completed early in the ensuing season, as will be seen by referring to that report. The winter proved less favorable to the prosecution of the work than usual; and the unfinished jobs were consequently less advanced at the opening of the spring than had been anticipated.

Soon after the season for the commencement of vigorous operations had arrived, it was discovered that some of the contractors whose jobs were in the most backward state, were prosecuting their work with so little energy, and, in some instances, were doing it in so unfaithful a manner, as to render it necessary to put in their places more faithful as well as more efficient men.

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY, BY JOHN KILBOURN, AT \$3 A YEAR, IN ADVANCE.

VOL. I. COLUMBUS, OHIO, SATURDAY, OCT. 18, 1828.

NO. 18.

Readers will notice that the Ohio Canal documents are continued on the third page of every number, from the last page of the preceding number.

The following description of a moveable Canal Lock, is taken from the American Mechanic's Magazine; and is there illustrated with a handsome drawing, and explanatory references. But, as there is no artist in Columbus, who pursues the business of making wooden cuts, suitable for letter press printing, we dispense with the drawing. Professor Renwick's description is, however, explicit without it. But any subscriber, who may have the opportunity and wish to see the delineated view of this Lock, can do so, by calling at this office.

Description of an apparatus intended to pass boats from one level of an artificial navigation to another, in cases where the want of water, or the height to overcome, would prevent the use of locks. By JAMES RENWICK, Professor of Natural and Experimental Philosophy, and Chemistry, in Columbia College.

The ends of the two levels of the canal are closed each by two gates, exactly similar to the gates of the upper end of a lock. Beneath the sill of the lower gate an excavation is made, deep enough to receive the moveable locks, that will be hereafter described. Between the bottom of this a regular slope is laid of timber, dry stone work, or masonry, on which are firmly bolted down four parallel rails, constituting two railways of iron. On each of these railways is placed a moveable lock or car of wood, with a gate at each end, of the same dimensions as those which close the two levels of the canal. These moveable locks are suspended by chains, from horizontal shafts, or windlasses, laid across the upper gates, at such an elevation as to permit the easy passage of boats beneath them. The shafts are so connected by machinery, that the descent of one moveable lock, turning the shaft to which it is attached, around, shall cause the ascent of the other. Boats may be passed in and out of the moveable locks, by letting in water between the gate of the canal, and that of the moveable lock, so as to make an equal hydrostatic pressure upon each of their faces; the gates may then be opened, and boats admitted or drawn out. One of the moveable locks being in contact with the aperture of one of the upper gates, and the other with the alternate opening at the lower end of the intended plane, and both being filled with water, by communication with the adjacent pond of the canal, they will be in exact equilibrio,

which state, the admission of boats, whether empty or loaded, will not affect. The gates being closed, and the moveable locks being cast loose, no motion will take place while the condition of equilibrium continues to obtain, but if water be permitted to escape from the lower lock, the upper will preponderate, roll down its railway until it reach the lower corresponding gate, and draw the other up into contact with the gate of the upper level, corresponding to its railway. The boats may then be passed out, and the manoeuvre repeated in the opposite direction. By this invention, of the success of which little doubt can remain, in consequence of the high authorities by which its adoption on the Morris canal has been recommended, the expense of canals may be very materially diminished, the sphere of their usefulness extended, by rendering them practicable in situations where they could not hitherto have been attempted, and the time and consequent cost of navigation much lessened.

OHIO CANAL LOAN.

We are gratified to learn, that the loan of \$1,200,000 of six per cent. stock of the Ohio Canal, redeemable in 1850, has been taken at 104.07 per cent. by a company formed of J. J. Astor, Prime, Ward, King and Co., W. G. Buckner, and T. and J. S. Biddle of Philadelphia. This is the last loan required for the completion of the great public work, to which it is to be appropriated, and which will be finished in 1830—five years from its commencement. We understand that the expense of the canal will fall within the amount of \$10,000 per mile; and offers have already been made to pay the interest of the debt, incurred by the construction of the canal, for the receipts of tolls to be realized immediately on its being opened.

The enterprise of Ohio, we believe, is without a parallel in history. There is no instance within our knowledge, where a public work of such magnitude and utility has been executed by so young a republic, whose very birth is within the recollection of many of its inhabitants. It is not a little creditable to New-York, that she set the example of internal improvement to her sister State, and that she has throughout lent a helping hand to the enterprise of the West.

N. Y. Statesman.

From the Worcester Mass. Spy of the 8th inst.
OPENING OF THE CANAL.

We have the pleasure of announcing to our readers the arrival at this place, yesterday morning, of the canal boat, 'Lady Carrington,' from Providence. Thus have the anticipa-

tions of those, who looked for an early accomplishment of this great project, been fully realized. When the magnitude of the work, involving an expenditure of more than half a million of dollars, and the many obstacles to be encountered, are taken into view, it is, indeed, matter of surprise that it has not been longer delayed. For the untiring zeal and patient industry with which the Commissioners have uniformly pressed onward, and for the firmness with which they have encountered every difficulty, they are entitled to the thanks and the grateful recollections of the whole community.

The *Lady Carrington* was moored in the basin at the head of the Canal at 11 o'clock. Her arrival was announced by the firing of the cannon and the ringing of the bells. An address was delivered to the assembled multitude, from the deck of the boat, by Col. MERRICK, Chairman of the Selectmen, after which, a large number of invited guests repaired to the hospitable mansion of the Governor, and partook of a sumptuous collation furnished in his usual handsome style.

We have been furnished with the following lines written for the occasion:—

THE LADY CARRINGTON.

What mean those guns, and that tremendous shout?

The town 'twould seem by demons is assail'd:
What can this fuss and fluster be about?

Has Adams or the Jacksonites prevailed?

"The boat's arrived!" the children in the street
Exclaim, partaking of the general fright;

"The boat's arrived," from every quarter greet
Our ears, while pressing forward to the sight.

Where are thy wheels, or hast thou none to show?

Thy runners then, or what is thy machine?
The water in our little "ditch" we know

Can boast great things, but never have we seen

So large a car by tandem drawn along

On wheels or sled with such apparent ease;
And then the multitude thy quarters throng!

How caust thou them contain, tell if thou please.

She comes! "The Lady Carrington" appears

In letters on her stern; 'tis then the boat,
The long expected visitant; for years

The promised guest in our canal to float.

We bid thee welcome, welcome to "the heart,"

The bone and sinew of this Commonwealth;
In cups of sparkling wine, before we part,

We'll drink to thee and thy successors' health.
W.

TO PREPARE PRINTER'S INK.

Put a quantity of nut or linseed oil into an iron pot, so as to half fill it; make it boil for some time, then set it on fire, and when it has burned for half an hour, put out the flame, and let it boil gently till it acquires a proper consistency. It is then to be removed from the fire, and, when cold, ground with lamp black in the proportion of two ounces and a half to sixteen ounces of oil. Vermillion or Prussian blue is used for inks of those colors.—*Amer. Mechanics' Magazine.*

ITEMS.

New York Post Office.—It may be a matter of curiosity to our readers to see a statistical view of this establishment, which exceeds any other in the Union in the amount of business transacted, (with the exception perhaps of that at Washington,) and also in its receipts. There are eight clerks, and the whole number of persons employed is twenty-four. The number of mails made up daily is about 150, most of them being large, and for distribution at other offices. Nearly forty thousand newspapers pass through the office weekly, and the monthly and quarterly periodicals probably are one-fourth that number weekly. Between fifty and sixty thousand letters are sent through the office every week. The Liverpool Packets usually deliver from 1500 to 2500 letters; the London about 500; the Havre 600 to 1200; the Mexican nearly 500; and the New Orleans 500. The packet ship *Florida*, which arrived last week from Liverpool, brought 2100 letters, which were counted, marked and ready for delivery in forty minutes! The amount of postage received during the quarter ending 30th June, exceeded \$38,000. The labor in this office is arduous, and the utmost activity, accuracy, and civility are required to expedite business, and do justice to the citizens and strangers, who throng there for letters. We believe that generally speaking, there is a full persuasion that the affairs of the office are faithfully and satisfactorily conducted.—*Jour. of Commerce.*

Tanner's Atlas.—We are glad to see the notice of a new edition of Tanner's General Atlas, in the Philadelphia papers. While so many imperfect, incorrect, and merely cheap (in name, but in reality dear) publications are hawked about the country; and while, notwithstanding all the means of better information, so few of our citizens are capable, in an enlarged sense, as an English lecturer observed, of "telling where they live;" the intelligent scholar and ingenious artist confer an obligation on the public by their labors, and ought to be patronized accordingly. It is scarcely necessary to remark, that Mr. Tanner's geographical works are brought down to the latest discoveries extant.—*N. Y. Statesman.*

OHIO CANAL.

PROPOSALS will be received on the 14th day of November next, at Lancaster, for the construction of *Forty-three miles of Canal*, lying between the Licking Summit and Circleville.

Twenty eight to thirty Locks, with two Aqueducts and a Dam across Walnut creek, are included in the work to be let.

Bidders, who are unknown as Contractors, to the Acting Commissioner, will be expected to accompany their propositions with recommendations of a substantial and unquestionable character.

Plans and specifications of the work may be seen at the office in Lancaster at any time after the 10th of November.

M. T. WILLIAMS,
Acting Commissioner.

Oct. 10, 1822.

A resort to this course is always unpleasant: It generally increases the expense of the work, as in most cases the jobs are necessarily re-let at enhanced prices, in consequence of the shortness of the time given for their completion, and the necessity of making extensive preparations for finishing an amount of work comparatively small. A corresponding loss to the first contractor is the unavoidable consequence. These considerations have induced the acting commissioners to avoid the changing of contracts, except in cases where it has been imperiously required by the public interest: and in many instances a resort to this measure has been delayed longer than comported with the interest of the state or with that of the individuals concerned.

In some of the cases referred to, this course was adopted as the only alternative to insure a correct and faithful performance of the work, and in all of them as the only means of insuring its completion at the time required by the public interest. Although the loss sustained by the contractors, whose jobs were declared abandoned, is a subject of regret, they have no just cause of complaint, as the time limited by their contracts had expired, and they had been frequently warned of the consequences of their remiss and unfaithful manner of prosecuting their work.

Notwithstanding the difficulties and delay occasioned by these circumstances, the canal from Akron, at the northern extremity of the Portage summit level, to the basin at Cleaveland, was so far finished as to permit the passage of boats throughout the whole distance, on the fourth day of July. On that day, two years from the commencement of the work, the first boat arrived at Cleaveland, having descended through forty-one locks, passed over three aqueducts and through thirty-seven miles of canal. Much solicitude was felt for the success of this first experiment on a new canal passing through so many difficult and hazardous places: the result, however, fully answered the reasonable expectations of the most ardent friends of the policy.

Several considerations combined to render it extremely desirable that this part of the canal should be completed at as early a day as possible. The time had arrived when the people of the state had been assured of having an opportunity of witnessing some of the effects of their exertions, some of the fruits of their labor. The public now expected at least a partial proof of the correctness of the opinions, plans and calculations of their agents, in which they had been asked to place confidence, and on which the ultimate success of the work must necessarily depend. For whatever confidence the public may place in the judgment of their agents, doubts must ever exist as to the correctness of untried plans and unproven theories until those doubts shall be dissipated by proof. A considerable amount of property had been deposited at Akron, with the design of transporting it by the Canal to Cleaveland, on the assurance of the Acting Commissioner that this part of the Canal would be ready for navigation in July. In the event of being unable to forward this property by the Canal, the owners would be under the necessity of transporting it to its place of destination by land, over roads exceedingly bad, subjecting them to great expense and much inconvenience.

Urged by these considerations, it became necessary to make use of extraordinary exertions and to press forward the most important parts of the work that remained in a backward state, owing to the circumstances which we have before related. This occasioned the neglect of those parts of the work which were esteemed of less pressing importance.

The construction of feeders from the main Cuyahoga, that had ever been esteemed necessary to insure an adequate and permanent supply of water for this division of the canal, was accordingly postponed. The sluices or feeders designed to pass the water round the locks from one level to another, were also left unfinished, and reliance was placed on passing the water through the culvert gates of the locks as a temporary expedient.

The canal was filled and supplied with water, while the rainy season continued, by the small streams naturally flowing into the canal, or which were easily turned in, together with a temporary supply from the main river, readily introduced while the stream continued swollen with floods. The supply furnished by the small streams was found deficient, as had been anticipated, when they had shrunk to their usual low water mark. This deficiency was increased by the difficulty of passing the water onward through the culvert gates of the locks, with sufficient regularity to keep the water of equal depth in the numerous short levels which occur on this part of the canal. The culvert gates were liable to be shut by accident or design, or to be choked with floating substances, which would raise the water in the level above and throw it over the waste weirs; thus occasioning a loss of water even where the supply was most deficient.

From these causes the navigation of the canal necessarily sustained considerable interruption.

As soon as the banks of the canal had become sufficiently firm to admit of raising the water in the canal with safety, and the attention of the engineers could be diverted from the constant watchfulness necessary to prevent accidents on the first filling of a new canal, means were taken to introduce a more ample supply of water. A feeder from the main Cuyahoga was introduced at the place where the canal first enters the valley of that river in its descent northwardly from the summit. The work of forming and securing sluices or feeders round the locks so as to pass the water regularly from one level to another, was also commenced: a temporary feeder from the Cuyahoga was also introduced at the Pinery, about fifteen miles above Cleveland, and a contract made for the construction of a permanent feeder near the same place, which is now in the progress of completion.

After these feeders were so far completed as to admit of the introduction of water, the canal was abundantly supplied from a point about one mile and a half below Akron to Cleveland: and the navigation continued without interruption, except that occasioned by a few small breaches, until late in December.

The most important of these breaches were occasioned by the high water produced by the excessive rains which fell during the latter part of October. The water of the Little Cuyahoga rose to a very unusual height; overflowed its banks and broke into the canal, at a place where a new channel had been formed for the stream, in order to avoid the necessity of crossing and recrossing it with the canal, and having passed along the canal about one fourth of a mile broke out by overflowing and cutting down the bank. The current of Tinker's creek, by a partial change of its course, was directed against the bank of the canal, where it was not sufficiently protected to resist its force, and by cutting away the earth, occasioned a breach into the canal. Both these breaches were repaired in a few days after the high water had so far subsided, as to permit work to be advantageously applied to that purpose. Means have been taken to prevent a repetition of these or similar accidents by enlarging the channel of the Little Cuyahoga and raising the adjacent banks of the canal, so as to prevent their being overflowed in one case; and by thoroughly protecting the banks with brush and stone in the other.

The expense of repairing these breaches and of securing the canal against their recurrence, has not been ascertained; it however does not probably exceed seven or eight hundred dollars.

A few accidents of minor importance occurred on that part of the canal which has been filled with water, such as must ever be expected on the first trial of a new canal. In some instances the natural soil on which the canal rests, is not found to be sufficiently firm to resist the pressure of water, and has given way, while the artificial banks raised thereon have remained firm.

until undermined by the water which passed underneath. Defective places of this description, as well as defective banks, are soon detected by the introduction of water, which were not discoverable before.

It is also found by experiment, as was anticipated, that artificial banks, especially those raised to a considerable height and not well packed while making settle much, and consequently need raising on the introduction of water. Even banks of this description which have stood for more than a year, are found to shrink after being saturated with water.

On the whole, the banks and other works on this part of the canal have proved to be as firm and secure, and as few breaches or other accidents have occurred during the past season, as were anticipated—fewer it is believed than usually occur on the first trial of new canals, equally exposed to the operation of floods, and to injury from other causes.

Means have been adopted to secure the banks of the canal from injury, in places where they are necessarily exposed to the operation of the strong current of the river. In some of these places where the water is deep, strong piles have been driven and interwoven with brush, in order to ward off the violence of the current, until a more permanent protection could be made. Slope walls of stone resting on the slope of the bank, or walls of hewn timber firmly secured to the bank by means of ties, have been built where the current was so rapid as to render the cheaper method of protecting the banks insufficient. In most places the plan of throwing rough heavy stone on the outward slope of the bank, has been found a cheap, effectual, and, it is believed, permanent method of preventing it from the abrasion of the current.

Some of these jobs were delayed with the view of using the canal itself for the transportation of stone from places where they can be easily procured, to places where they are wanted for protecting the banks. The expense of these works is much diminished by this operation below what it would otherwise have been. Those points exposed to the greatest danger have already been secured, and ample provision has been made for securing all those which remain unfinished.

The only part of the work which has not been so far finished as to admit the free passage of boats from Lake Erie to the Portage summit, is the two locks by which the canal is to be connected with the river at Cleveland. The point of connection fixed on, is less than half a mile from the mouth of the river. These locks are to be of sufficient dimensions to admit the passage of sloops and schooners of the largest size now navigating the Upper Lakes, from the river into a large basin near the termination of the canal. In this basin the vessels of the Lake and the boats of the canal may meet and exchange their cargoes in perfect safety, secure from the effect of storms and the inconvenience of floods, drifting ice or timber. Canal boats may with equal facility descend into the river and there meet the vessels or pass into the Lake whenever circumstances render this course more desirable than the former.

Considerable progress has been made in the construction of these locks. Most of the materials are prepared—the foundation of one is laid and the walls commenced. It is expected that they will be finished in the month of May next, when the short portage between the basin and the river, which has proved a serious inconvenience in the transaction of the forwarding business during the past season, will be avoided.

The operations and experiments of the past season have confirmed, beyond doubt, the opinion expressed in the former reports of the board, of the abundant supply of water on the Portage summit, and on the levels both north and south of the summit.

In relation to this subject, it will be recollected that the Tuscarawas was relied on by the board for the supply of the summit and the contiguous levels.

Descending northwardly from the summit it has never been proposed to receive water from any other source until the canal comes in contact with the Little Cuyahoga, after passing sixteen locks, except what naturally flows into the canal from two small streams, which were never expected to yield more than would be lost by evaporation and leakage through the lock gates.

During the past season no water has been introduced from the Tuscarawas; and notwithstanding the entire absence of the supply, on which alone reliance was placed, the small streams flowing into the basin at Akron have furnished water sufficient for the transportation of more than a thousand tons of property through the fifteen locks between that basin and the place where the feeder from the Little Cuyahoga is introduced. It is not doubted that the large and constant stream of the Tuscarawas, aided as it will be by an area of near four hundred acres of natural reservoir, attached to and forming part of the summit level, will be more than sufficient to supply the demands of the most active commerce of which a canal is susceptible.

During the driest part of the past season, about one third part of the medium quantity of water, then flowing in the Cuyahoga, was received into the canal through the feeders, and was found to be an abundant supply. Indeed, while this portion of the river was introduced, a large quantity of water was almost constantly flowing out of the canal, at the waste weirs on the various levels.

The transportation of property on this part of the canal, though it has been small, compared with the amount transported on the canals of New York, has equalled the expectations formed previous to the introduction of the water. Of property paying toll by weight, there has been transported northwardly, an amount equivalent in weight to upwards of ten thousand barrels—and southwardly, more than eight thousand barrels. Flour, Tobacco, Whisky, Beef, Butter and Cheese have formed the principal amount of downward transportation; and Merchandize, Salt and Fish are the principal articles transported in the opposite direction.

The transportation of mineral coal, from the beds in Tallmadge to Cleveland, was also commenced previous to the close of the navigation. This promises to be an important and valuable branch of trade when the canal shall have reached the extensive coal beds of the Muskingum and its branches; many of which are situated so near the canal as to require little or no land transportation. Large quantities of stone and other materials for the building of locks, and protecting the banks of the canal, have also been transported, on which no tolls have as yet been charged.

The amount of tolls received by the collector at Cleveland, up to the 17th Dec. is \$909 69. The amount received by the collector at Akron has not been ascertained to so late a date. It probably falls short of the amount received at Cleveland, as the articles transported northwardly, though greater in amount, have not generally paid so high a rate of toll.

Time is always required to bring commerce into new channels, however preferable they may be to the old; much preparation is necessary, before the new channel can be advantageously substituted, and a want of confidence in the superiority of the new method to the old, is for a time felt. The inducements to transport property for a short distance on a canal are comparatively small; particularly where it cannot be thus transported the whole distance it must go, as a change in the method of the conveyance is thereby rendered necessary. As the canal is extended into the interior, the extent of country which participates in its benefits, and consequently the business, is increased in a compound ratio on its length, while the average distance which each article is transported, is increased in proportion as the length of the canal is extended. The tolls, therefore, which are collected on a short section of canal must bear a small proportion to those collected on a long section, extending through a country of similar character.

It is impossible to estimate with certainty, the amount of tolls which will be received on the Ohio canal during the current year. Should the navigation be extended, so far as we now have reason to expect, and at as early a period, it is probable that the amount will not fall far short of ten thousand dollars.

The contemplated works for improving the channel at the mouth of the Cuyahoga river, so as to secure to vessels navigating the Lake a safe and convenient entrance into the river, have been progressing during the two last seasons, under the direction of the agents of the General Government, and by means of appropriations made by Congress for that purpose.

A pier extending into the Lake 600 feet nearly at right angles with the course of the shore, has been erected on a very substantial plan. This pier has for more than a year, resisted the force of the waves, and the shocks of drifting ice, without receiving the least injury. A new channel has been formed for the river on the eastern side of this pier, and an additional pier extending still farther into the Lake, is to be erected. Between these piers the water and channel of the river, are to be conducted into the Lake beyond the point where the channel will be subject to obstruction from moving sand.

So far as this work has progressed it has produced the effect anticipated by its projectors. While the river passed into the Lake on the west side of the pier, its channel continued open until a dam was thrown across it, in order to direct the waters of the river into the new channel. No doubt is entertained, that a safe and convenient harbor will be formed and secured by the accomplishment of the proposed plan.

The anticipations of the board in relation to the time when the canal between Akron and Massillon would be prepared for navigation, have not been fully realized. Although most of the sections were finished or nearly so, by the time limited in the contracts, a few of them are not at this time entirely finished. Of these sections, the one extending from the summit lake, to the Tuscarawas, is much the most backward, and is indeed the only one which is not susceptible of being finished, by moderate exertions, in a few weeks.

The great delay in finishing this job has resulted from the difficulty of draining it, during the progress of the work. This difficulty was foreseen at the time of the first letting in 1825. In order to obviate it as far as possible, the contractors for the section extending north from the summit lake, towards Akron, were required so far to finish their work, as to draw off the waters of the lake nearly to the level of the bottom of the canal, as early as the winter of 1825—6. Had this stipulation of the contract been complied with, it would have afforded great facilities for draining the waters from the canal whilst in the progress of excavation through the swamp, which extends from the south end of the Lake to the Tuscarawas. The waters of the Lake were however not drawn down until the month of September 1826; and until this period, the contractors for the job through the summit swamp, were deprived of the privilege of draining their work in that direction.

At the south end of the swamp, the level of the water in the Tuscarawas is so high as not to permit the canal to be drained to bottom in that direction, even at the lowest stage of the water. And the surface of the water does not descend sufficiently to admit of draining the canal into the river until it has flowed a mile and a half from the place where the canal first approaches near the stream. A drain could not therefore be obtained in that direction, until the canal between those points should have been completed. This job was in the hands of another contractor who was not bound to finish it until the first day of July last.

Notwithstanding these embarrassments and delays, the contractors for the section between the summit lake and the Tuscarawas, felt confident of being

able to finish their job by the time required by the contract, until the last winter. That season however proved so unfavorable to the prosecution of the work, on account of the coldness of the weather and the great quantity of snow, that little progress was made. On the opening of the spring the work was resumed, but the frequent and heavy rains prevented its rapid advancement. During the months of July, August and September, the work could not be prosecuted except at a great sacrifice of health and life of the laborers, and was therefore suspended.

On the return of the healthy season, operations were resumed with vigor and success; and as the contractors have now, or will soon have the advantage of draining their work to the south as well as in the opposite direction, it is confidently hoped that the job will be finished early in the spring. Of about 230,000 cubic yards of excavation, originally contained in the job, it is believed no more than 50,000 now remain to be excavated.

A section of the canal extending from Massillon, north near eight miles, has been so far finished as to admit of its being partially filled with water, and used for the transportation of stone: It is expected that the entire line north of New Philadelphia will be finished in July next.

The whole of that part of the Ohio canal, between Lake Erie, and the Licking summit, which had not been put under contract at the date of the last annual report of the board, has been prepared for work, and contracts for its completion have been made during the past season. This division of the canal extends from Goshen to the narrows of Licking, a distance of sixty-five miles. The work has been let on terms as favorable to the state as that which had previously been put under contract. The contractors are bound to finish this part of the canal by the first day of September next.

On this division several important changes have been made in the original plans of the work; on which the first estimates of its cost were predicated. These alterations, in a number of cases, will considerably enhance the expense, and at the same time contribute greatly to the safety of the canal, and will render its navigation much less subject to interruption.

It was originally proposed to cross the Walhonding or White Woman river, the Tomaka creek, the North and Racoon forks of Licking, by means of dams. This plan would have subjected the navigation to occasional interruption by floods; would have rendered the crossing of these streams with boats at all times inconvenient, and frequently dangerous. After carefully estimating the cost of each plan, on mature reflection, it was thought best to cross each of these streams on aqueducts.

Several other deviations from the original plan and location, have also been made. Most of these changes particularly in the location of the canal, elevation of the levels, lift and position of the locks, have operated to diminish the cost, as well as to contribute to the safety and convenience of the canal.

A navigable feeder something more than three and a half miles in length, from the Tuscarawas river, a short distance below the mouth of Stillwater, to the canal near Tuscarawas town, has been located and put under contract. This feeder will serve the double purpose of increasing an abundant supply of water, and at the same time the boats which may descend the Stillwater. It is said by those well acquainted with this stream, that its navigation may be improved for a moderate sum so as to extend the benefits of canal navigation, to the heart of one of the most populous and wealthy districts in the state.

The change in the plan of crossing the Walhonding or White Woman, has rendered it necessary to construct a feeder from that river. A navigable feeder of about one mile and a quarter in length, has been laid out accordingly, and put under contract. This feeder is on the west side of the river and joins the canal soon after crossing the aqueduct, and locking down to its

level. It will connect the navigation of this river and its branches with that of the canal, and prove highly useful to the extensive and fertile country situated on its waters.

A very desirable quantity of water may be taken into the canal from this copious and never failing stream, creating much valuable hydraulic power, both at the locks by which the canal descends to the lowest level between the Portage and Licking summits, and also where the surplus water that must accumulate on this level is discharged into the Muskingum, after it can no longer be serviceable for the purposes of navigation. In a country abounding in iron, and nearly destitute of convenient water power, these privileges may be made very profitable to the state, as well as highly beneficial to the surrounding country.

The whole cost of the canal, from its junction with the Cuyahoga river at Cleaveland, to the south end of the Licking summit level, including feeders, reservoirs, bridges, and the various other works which may more strictly be denominated parts of the canal itself, estimated at the prices for which it has been finished, and for which the work is now going on where it remains unfinished, is 1,782,000 dollars.

The length of the canal between these points varies but little from 194 miles. The length of the Tuscarawas and Walhonding feeders which we have described, is 4 miles 67 chains; making an aggregate of canal line and navigable feeders of 198 miles 67 chains. The average cost of each mile of canal and navigable feeder, will be found to differ but little from 8,960 dollars per mile.

The length of the line of main canal, from Cleaveland to Kaldersburgh, a small village on the west side of the Muskingum, opposite Coshocton, is 135 miles, that of the navigable feeders as above stated, 4 miles 67 chains, making the aggregate length of the canal and navigable feeders 139 miles 67 chains. The aggregate cost of this division, including the feeders, is estimated at 1,122,000 dollars, and the average cost of each mile at 8,026 dollars.

The length of the canal from Kaldersburgh to the south end of the Licking summit level, is 59 miles 8 chains: its estimated cost, including the great reservoir and the feeder to convey the waters of the South fork of Licking into it, is 660,000 dollars; giving an average of 11,166 dollars per mile.—The extensive deep cut at the Licking summit, and that across the dividing lands between the Licking and Tomaka valleys, are included in this division, and with the reservoir, and its feeder operate to swell greatly the average cost per mile.

In obtaining the results here presented, the actual value of the work, estimated at contract prices agreeably to the final certificates of the Engineers, in all cases where the contracts have been completed, is carried into the account. In those cases where the jobs remain unfinished, the quantity of work estimated from the most accurate data in our possession, have been computed at the existing contract prices, and the amount thus ascertained.

The cost of protecting the banks of the Canal from injury by floods—of raising such as have settled—of securing and fortifying weak and defective places—of repairing such breaches as have occurred—of constructing sluices or feeders round the locks—of paving the banks with stone, which has been done to a considerable extent where stone were found in excavating the Canal—of sowing the banks with grass seed of various kinds, which has been done throughout the greatest extent of those parts of the Canal that have been finished, as well as various other small items of expense necessary to the safety and permanence as well as utility of the work, are included in the estimated cost of the Canal, as far as they can be now ascertained.

So far as the estimates now presented are predicated on the final certificates of the Engineers, where jobs have been finished, no material error can

exist: Nearly one half of the total amount has been made up of items thus ascertained. In relation to those jobs which are still unfinished, we cannot arrive at the same degree of certainty. Items of unforeseen expense necessary to give security and permanency to the work, or to increase its utility, may, and probably will contribute to swell the aggregate cost to a sum somewhat larger than that now exhibited. Among so many contractors as are now engaged on the Ohio Canal, the failure of some is an event to be expected; and the consequent necessity of re-letting jobs in such cases, often at higher rates than those of the original contracts may also serve to enhance the expense of the work. After making due allowance for these contingencies, it is confidently believed that the final cost of that part of the Ohio Canal which has been put under contract, will not greatly exceed the amount above stated, and will fall considerably short of the sum at which its cost was originally estimated, notwithstanding the increased expense of several parts of the work incident to a change of the plan.

The first estimate made on the cost of that part of the Ohio Canal which extends from the south end of the Licking Summit level to the point then proposed for its northern termination in the Cuyahoga river, six miles from the Lake, fixed the expense at \$1,912,713 43, including ten per cent. on the net estimate to cover contingent and unforeseen items of cost. To this sum should be added 25,000 dollars for the extension of the Canal to Cleaveland from the place then proposed as its northern termination, and 30,855 dollars, the estimated cost of the Tuscarawas and White Woman Feeders, neither of which works were contemplated in the original plan—making an aggregate of \$1,967 568 43.

The total value of work actually performed on the Ohio Canal from its commencement up to the first of December last, estimated at contract prices, is 1,085,068 dollars; leaving work to the estimated value of 696,932 dollars to be performed in order to finish that part of the Canal which has been put under contract. There has been paid to contractors up to the same date, on account of this labor performed, the sum of \$1,019,210 93: requiring the estimated balance of \$762,789 07 to finish this division of the canal.

Of the value of work thus performed, \$772,000 00 have been done on the line between Lake Erie and Kaldersburgh, and \$313,068 00 between Kaldersburgh and the south end of the Licking Summit level.

Of the money paid as above stated, \$724,511 78 has been paid on the line between the Lake and Kaldersburgh; and \$294,699 15 between the latter place and the south end of the Licking Summit level.

Of the work under contract now remaining to be performed, the estimated value of \$350,000 00 is to be done north of Kaldersburgh, and \$346,932 00 south of that place.

It will be readily seen from the foregoing statements, that work has actually been performed on the Ohio Canal, previous to the first day of December, equivalent to the completion of 121 miles of the same average cost with the whole line that has been put under contract. This work would have finished the Canal from Cleaveland to the crossing of the Walbonding river, had it been applied solely to that part of the line.

The past season has been peculiarly unfavourable for the vigorous prosecution of the work on the Ohio Canal. Much rain fell in the spring and the early part of the summer, particularly in the northern part of the state; and since the middle of October few days have occurred in which work could be carried on to advantage, owing to the same cause. The heavy rains which fell in the latter part of June and the first of July, succeeded as they were by weather extremely warm and dry, or some other cause to us unknown, occasioned the prevalence of sickness to an unusual and alarming extent, especially in the valley of the Tuscarawas and Muskingum. The alarm created by

the prevalence of fevers along this line of canal did not cease to operate in deterring laborers from coming on to the work, until long after the cause of alarm had ceased to exist.

From this cause, and others, among which the extensive operations on the Pennsylvania Canal and the National Road did not fail to produce their effect, labourers were unusually scarce and with difficulty procured.

Under these circumstances, the work on the Ohio Canal has not progressed as rapidly as was anticipated at the date of our last report, and a longer time will be required to finish the canal to the Licking Summit than the time then fixed on as the probable period required for its completion. It is, however, confidently expected that the whole canal, from the Lake to the Licking Summit, will be ready for navigation as early as the spring of 1829.

In relation to the Miami Canal.

The first division of this canal, extending from the head of Main street in the city of Cincinnati, to the mouth of the Miami feeder, a distance of 44 miles, has been completed during the past season. Its full completion was delayed until the latter part of the season, in consequence of the multiplied difficulties which had to be encountered by the contractors, in completing their work on the heavy cliffs and embankments in the valley of Mill creek. The greater part of the line was finished as early as mid summer.

The introduction of water into this canal was commenced about the first of July, and was attended with serious difficulties: By continued and persevering efforts, thirty-eight miles of it were sufficiently filled by the first of November for the running of boats. The extensive beds of very coarse gravel, over which the first twenty miles of the canal are constructed, with the dry condition of the earth and pure state of the water at this season of the year, rendered the operation of filling it difficult and tedious. The process was rendered more difficult, from the circumstance of there being but one point from which water could be drawn to supply the demand, produced by the great absorption throughout the line below. Experience soon established the point, that a patient perseverance was the only safe, and in the end the most expeditious course which could be pursued. To increase the volume of water introduced from the river, with the view to hasten its progress forward in the canal, only added to the liability of the new banks to give way, and thus to produce delays much more serious than would be experienced by the flow of water in smaller quantities, proportioned more nearly to the power of resistance of the new and porous banks. The first view of the difficulties in filling this section of the canal, seemed to wear a discouraging aspect; but a little observation and reflection were only necessary to satisfy the mind, that the evil was merely temporary: The result has proven it to be so. Though by very slow degrees, and for a time scarcely perceivable, the absorption continued to lessen, until with but little increase of the supply from the river, the canal was filled to a natural basin about six miles, by the line of canal, north of Cincinnati.

It was deemed prudent to arrest the progress of the water at this point, with the view to allow the heavy clay embankment below it, under the seasoning influence of the winter frosts and rains, time to settle, and to acquire that solidity and strength which it is necessary they should have to render them safe, and which can only be acquired by the aid of time and the seasons. Embankments of the magnitude of these, where clay is the only material of which they are composed, cannot be used while in a green and unsettled state, without incurring greater risk than the dictates of prudence will sanction. In the present case the obligation to adhere to the counsel of prudence was the more binding, as the season had too far advanced to admit the idea of doing much business on the Canal before the spring.

Navigation throughout this division of the canal may commence as early in the spring as the bank can be raised, and such repairs made as the effects of the winter upon this part of the line may render necessary; and a full confidence is felt, that the business which will be done upon it, and the benefits resulting to the country, will be equal to the most sanguine anticipations of the Commissioners.

On the 28th of November, three fine boats, crowded with citizens, delighted with the novelty and interest of the occasion, left the basin six miles north of Cincinnati, and proceeded to Middletown with the most perfect success. The progress of the boats was equal to about three miles an hour, through the course of the whole line, including the detention at the locks and all other causes of delay, which are numerous in a first attempt to navigate a new canal, when masters, hands and horses are inexperienced, and often the canal itself in imperfect order. The boats returned to the basin with equal success, and it is understood have made several trips since, carrying passengers and freight. The success of these experiments in canal navigation, and the obvious facility with which heavy burthens were moved by the power of even a single horse, must go far to convince the most incredulous of the high interest and importance of such a channel of commercial intercourse, passing the heart of a country as populous and productive as that through which this canal passes.

The levels throughout this line prove to have been taken with the nicest accuracy, and the work generally appears to have been constructed in a substantial manner. Some breaches have occurred on the first introduction of the water, and in consequence of the late very heavy rains, but not to a greater extent than must be expected in all new canals. The liability to evils of this nature will gradually lessen, as time and the effects of the water upon the banks increase their solidity and strength. Two breaches occurred in the course of the season, at a point about five miles above Hamilton, where the canal was constructed in the face of a bluff bank with the river, and considerable depth of water immediately at its base. The embankment at its base yielded to the pressure from above, and spread in the deep water of the river; the breaches are repaired, and probably have added to the security of the other parts of the same line of embankment. Another breach occurred in the embankment at Gregory's creek, produced by the interference of an individual in closing the lock gates below, without the knowledge of the Superintendent, before sufficient waste ways had been prepared to pass off the accumulated water. But the most serious injuries experienced were at the aqueduct over Mill creek: From the peculiar character of the bottom of that stream, the spring floods undermined the foundation of one of the piers, so as to require the rebuilding of about ten feet of the head of the pier, and one of the wing walls of the same work also gave way, a few days after that level was filled with water. The space between the wing walls not occupied with puddle, was filled with a very fine sand (the adjoining material) which on being exposed to the influence of the water, became a quick sand, assuming a semifluid state. The powerful pressure of this mass overcame the wall; which on a careful inspection, was found to have been built in a very unskillful manner. The wall has been rebuilt and the breach fully repaired. Other breaches of minor importance have occurred, which have been repaired, and measures have been taken, as far as practicable, to guard against similar evils.

The feeder from the Great Miami was completed at an early day in the season; but the dam did not progress with equal success. When nearly completed, a swell in the river, produced by the rains in October, caused a breach in the unfinished part, which from the advanced stage of the season and a constant succession of rains and high water, could not be then repaired, and its final completion was necessarily postponed until another year. In

the mean time a sufficient supply of water for the canal may be drawn from the river, by the aid of the brush dam which gives the present supply. Immediately after the injury to the dam was sustained, the contract was declared to be forfeited on the part of the contractor, the work taken possession of by the state, and measures immediately taken to secure the dam against further injury, which it is believed will prove effectual. The principal Engineer was directed to make a particular examination of the state of the work, and of the accounts connected with it, from which it appears that the Acting Commissioner had retained from the contractor, money sufficient to admit of the completion of the dam by the state, within the sum which would have been payable, had it been completed under the contract. This opinion is predicated upon the idea that the work will sustain no further injury. Several floods have occurred in the river since, which do not appear to have extended the injury.

Contracts were closed on the 26th of May, for the construction of the remaining division of this canal, which begins at the mouth of the feeder from the Miami river, and terminates in a dam in Mad river, about one mile above Dayton. That part of it from the saw mill at Dayton, to the Mad river dam, is designed upon the present arrangement, to serve as a feeder, but in the event of the extension of this work to the north, at any future period, to be used as a section of canal. This division, to the dam, is 23 miles and 28 chains in length; it embraces ten locks, one aqueduct with a wooden trunk, three of heavy stone arches with embankments of earth over them, and a dam across the Mad river. The remaining work is generally of the ordinary character, with the exception of the cedar bluffs near Dayton, and a very heavy bluff bank at Vail's mill, immediately below the mouth of Clear creek. At each of these points the river comes in contact with the high lands, presenting passes for the canal expensive and somewhat difficult to encounter.

The work on this line has progressed since its commencement with much activity, and is already in a very forward state. By the terms of the contracts, it is to be completed on the first day of June next; the advanced state of the work justifies the opinion that it will be completed all in the month of July.

The stone work on this division, which has, heretofore, on the Miami canal, cost much more than it was originally estimated to cost, has been let at rates about equal to the first estimate; and the earth work at as low rates as on any other part of the canals: But throughout the line of the Miami canal, it has been found, that the quantities of most of the different items of work, upon which the first estimate was founded, fall short of the actual quantity, and that its actual cost must necessarily exceed its estimated cost. The plans for crossing the different streams now adopted, are in many cases more costly, but probably more substantial, than those upon which the original estimates were made. In several instances, heavy arches of masonry have been adopted, where wooden aqueducts or dams, were the plans upon which the first estimates were founded. The item of locks is however the great cause of the difference between the actual and estimated cost of this canal, compared with that of the Ohio canal, north of the Licking Summit. The principal saving on that part of the Ohio canal now under contract, will be in the cost of the locks. A very large proportion of the lockage is embraced in that line, and from the great facility of procuring stone of the easiest quality to work, the locks from the summit to Kaldersburgh, will be constructed at an average of \$1,500 each, less than the first estimate of their cost, and those from the latter point to Lake Erie, upon terms but little less favorable; while on the Miami Canal, the locks instead of being the chief item of saving, have necessarily cost a sum considerably above the original estimate. The heavy bluffs and embankments encountered on the line, have also contributed to swell the actual over the estimated cost of it.

The payments made on the entire line within the year, ending on the first of December, amount to \$258,525 79, which, with the sum of \$297,296 98 previously paid, makes the total payments to contractors on this canal, \$555,822 77.

There has been paid on the line from Cincinnati to the Miami feeder the sum of \$456,854 52, and there remains yet to be paid, the sum of \$1,115 16, making the total cost of this line of 44 miles, \$457,969 68, or \$10,408 40, its average cost per mile. This sum includes what has been paid in raising banks, in strengthening, securing and repairing the canal, and in building lock houses up to the first of December. There has been paid on account of the dam and feeder, to the contractor, \$10,614; and to the Superintendent, since the work has been taken into the hands of the state, \$600; in all \$11,214 00.

The original estimate of the cost of this division of the canal, commencing at the Ohio river, and including the dam and feeder, was \$474,254 00. The actual cost of the same, beginning at the head of Main street in Cincinnati, including the payments on account of the dam and feeder, is \$469,183 68.

The estimated cost of the upper division of this canal under the contracts, is \$234,686 54; the work performed agreeably to the certificates of the engineer, amounts to \$96,040 41, leaving work to be performed, to the amount of \$138,646 13. To this should be added the probable sum of \$3,000 00, which will be required to complete the dam across the Miami river.

Awards have been made by the board of appraisers, in favor of individuals for damages sustained by the construction of the canal, to the amount of \$5,011 54, which have been paid to the amount of \$4,521 87. The sums awarded have been mostly for stone and timber used in the construction of the canal. There are several claims for the value of land occupied, and for injuries alledged to have been sustained by the separation of the different parts of a farm, which have not yet been decided upon by the appraisers. A schedule of the awards which have been made, is herewith submitted, marked A.

GENERAL REMARKS.

Sales of town lots, belonging exclusively to the state, in the village of Akron have been made to an amount exceeding two thousand dollars. On these sales moneys to the amount of \$483 45 have been received and paid into the treasury for the benefit of the canal fund. Sales to a considerable amount, believed to be between two and three thousand dollars, have also been made of lots in the village of Massillon, of which the state is entitled to one third part. As no partition has as yet been made of the lots in the latter town, between the state and the other proprietors, the amount of sales is not precisely known, and the money, if any has been received thereon, still remains in the hands of the original proprietors.

The interest of the state in these flourishing villages will be found much more valuable than it was estimated to be in the schedule of donations accompanying the report of the board of December 1825, particularly in the village of Massillon which, in that schedule, was estimated much too low.

The amount which will be received from sales of lots in these villages during the current year will probably exceed one thousand dollars. To this sum may be added the probable amount that will be received on subscriptions in aid of the canal fund, estimated at two thousand dollars.

Under the authority of the "Act to provide for the increase of the canal fund by the purchase and sale of real estate," the commissioners have bargained for the purchase of several small tracts of land. These bargains have been perfected, by obtaining deeds and paying the amount of the purchase money, in but two instances. One of about eight acres, adjoining

Lock No. 27 north of the Portage summit, near the south line of the township of Boston. The other of 9 acres 88 hundredths, adjoining the two last locks by which the Ohio canal descends southwardly to the lower level between the two summits. This tract is situated near the north line of Muskingum county, and is very conveniently located for the use of the water power which may be obtained at this place. The sum of \$150 00 was paid for the first, and \$296 40 for the tract last described.

The debts due the state from John Matthews and George Jackson, and from Benjamin Sells and Samuel Thompson, which the board were authorized, by resolutions of the last General Assembly, to collect in labor on the canals or otherwise, have not as yet been collected. It has been found difficult to collect these debts by giving to the debtors contracts for work on the canals; unless the work is given to them at rates so much above those for which other responsible men would take it, as to make the extra cost of the work to be performed equivalent to the debt due the state.

An offer has been made to pay the first of these debts in lands advantageously situated on the Ohio canal, near the village of Dresden, on terms which the board deem beneficial to the state. As the commissioners believe themselves authorized by the resolution of the General Assembly to enter into this arrangement, they therefore consider it their duty to obtain payment of the debt in this method, unless the General Assembly shall think proper to put a different construction on the resolution, or otherwise provide in relation to the case.

A board of appraisers, consisting of Owen Brown, of Portage county, Rufus Ferris, of Medina county, and Nehemiah Allen, of Cuyahoga county, has been appointed by the acting commissioner to assess the amount of damages claimed by individuals, in consequence of taking materials, and the occupation of land necessary to the construction of the canal between the Portage summit and Cleaveland. These damages have been assessed by this board to the amount of \$2,687 00, as exhibited in the annexed schedule marked B. This sum has been awarded principally on account of materials taken, of lots to be occupied by houses for lock tenders, and to aid in the building of farm bridges where farms are divided by the canal. The total amount of damages assessed on account of land occupied by the canal is very small.

To assess the claims by individuals for damages sustained in consequence of the canal, reservoir and feeder on the Licking summit level, a board composed of John Leist, of Fairfield; Daniel Converse, of Muskingum; and Joseph Ridgway, of Franklin county; has been appointed by the acting commissioner for that part of the canal, who have assessed damages to the amount of \$1,223 00, chiefly on account of land occupied by the reservoir, timber taken for securing the bank and making waste and feeder gates, as stated in the schedule marked C.

The measures which have been taken by the acting commissioners to secure to laborers on the canals the just reward of their services, have produced a beneficial effect, particularly on those parts of the line which have been put under contract since the adoption of those measures. The right reserved by the acting commissioner, in the contract, of withholding moneys from the contractor and paying over to the laborer directly the sum due him for work, whenever a disposition on the part of the contractor not to make punctual payments is evinced, has had the effect to introduce greater punctuality in the payment of laborers.

Still however instances occur in which all the exertions of the acting commissioners have failed to produce the desired effect. The neglect of laborers to use suitable exertions and to take the necessary measures to insure the payment of their wages, or even to inform the commissioner of a failure in this respect until it is out of his power to coerce payment, together with the

want of economy and bad management on the part of the contractor in some instance, are the principal causes of the existence of the evil; an evil which it is extremely difficult if not impossible entirely to prevent.

When jobs are taken at prices which require strict attention, economy and good management to make them profitable, and the contractor, disregarding his own interest as well as that of the state, pursues a different course, a serious loss either to himself, or to those from whom he has obtained labor and supplies, is the necessary consequence, unless they are saved harmless at the expense of the state.

The board have not thought themselves authorized to remunerate losses which are the consequence of negligence or mismanagement, under the law which requires them to expend the moneys placed in their hands for making the canals "in the most economical manner."

In the performance of that part of our duty, which requires the board to recommend from time to time to the General Assembly, such measures as the prosperity and security of the work committed to our care, seem to require or the public interest to demand, the following remarks and suggestions are respectfully submitted.

In determining the proper routes for the canals authorized by law, instances occur in which the peculiar formation and levels of the country, the course of rivers and streams, or other considerations, render it necessary to locate the canal in the neighborhood of towns which have been building for years, and in which a large amount of fixed capital has accumulated. The peculiar localities, at the same time prevent the canal from passing through those towns, or so near them as to admit of their participating freely in the commercial advantages which it offers. As towns will naturally spring up in those places where facilities for the transaction of commercial business invite, and trade will desert the neighboring towns less favorably situated, population and wealth will unavoidably follow, unless measures are adopted to counteract this tendency and prevent its obvious effect.

The construction of short side cuts or branch canals, or the connecting of the main canal with a navigable river, which intervenes between the town and the canal, will, in several of the instances to which we allude, extend to towns of many years standing the benefits of canal navigation, and thus prevent the destruction of a large amount of fixed capital, and the consequent injury or ruin of many of our fellow citizens.

In some of these cases the individuals interested are willing to encounter nearly all the necessary expense of making the proposed improvement, and in others the value of donations and the hydraulic privileges created by the proposed works, would amply remunerate the state for the expense to be incurred.

The board entertain doubts as to their power to undertake these works, however desirable and proper in themselves, or even to lay out the improvements to be completed under the authority of the state at individual expense.

With this view of the subject, the General Assembly, may deem it proper to authorize the board to construct such of the works to which we have alluded as may be necessary to prevent a great sacrifice of individual property, and where the expense to be incurred by the state will be little or nothing, under such restrictions and limitations as will prevent an improper use of the power granted.

The experience of the past season has pointed out several defects in the laws designed for the protection of the canals from injury.

It is absolutely necessary, in order to prevent breaches and other injuries to the canal, that the commissioners and their agents should have the unlimited control of the works, at least until they are so far completed as to be secure against accidents and contingencies of ordinary occurrence, that they have

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY, BY JOHN KILBOURN, AT \$3 A YEAR, IN ADVANCE.

VOL. I. COLUMBUS, OHIO, SATURDAY, OCT. 25, 1828. NO. 19.

Readers will notice, that the Ohio Canal documents are continued on the third page of every number, from the last page of the preceding number.

RAIL ROADS IN ENGLAND, &c.

Extract of a letter from a Gentleman now travelling in Europe, addressed to the President of the South Carolina Rail Road Company.

"Liverpool, August 8.—I have now the pleasure of communicating the result of some observation which I have been enabled to make, since I last wrote you. With the exception of one or two small roads at some of the coal mines near this place, the rail road at Leeds, was the first of much importance that I visited after leaving Liverpool. The rail road is about 3 1-2 miles in length, extending to a coal mine. It was constructed about fifteen years since. The rails are of cast-iron, in lengths of three feet, and mostly in bad order. Most of this road descends a little from the mine, and about the middle of the line, has a self-acting plain of 300 yards in length. They use a locomotive from each end of this plain; which they have had in use seven or eight years, and think them preferable to animal power. These engines are not of the most approved kind—They, however, travel with their train, consisting of fifteen or twenty cars, weighing near four tons each, at the rate of 2 1-2 or 3 miles per hour. I rode up and down the line of road on one of them, and find that they are easily managed, and that their direction can be sooner changed than the time required to move a horse for that purpose. The next rail road of much importance that I visited, was the Darlington and Stockton. This was the first experiment to apply rail roads to the purpose of promiscuous traffic, and was opened to the public about two years since. The whole extent of this road, including some branches, is about 30 miles; and although its general object was to open a communication from the navigation at Stockton, with an extensive coal region, it was also designed for the general trade of the interior. This road is a single track, and although the passings are from two to three in the mile, the detention to the trade in both directions, is not very great. They use both horses and locomotive steam engines upon this road, and have had a fair opportunity of testing their relative utility. The result has been much in favor of locomotives, as a reference with which I was favored to the accounts of the company, fully testifies. The locomotives on this road are used only in the coal trade, and run a distance of twenty miles from Stockton—the greater part of this distance descends towards Stockton varying from 1-16 to 1-2 inch per yard;

no part ascends in that direction, and only about two miles is level. They use four locomotive engines on this road, which lead from 20 to 23 cars in their train, weighing each 53 cwt. independent of the car itself, and travel at a speed of four to seven miles per hour.—Three of these engines are of Losh & Stephenson's construction, as they are generally called here, and one of them of Hackworth's. I rode up and down the road on these different engines, a distance of thirty to forty miles. Losh and Stephenson's engines usually carry 20 cars—Hackworth's 24, and sometimes 28, with which it is capable of travelling 6 a 7 miles per hour. The others travel 5 a 6, which is as great a rate of speed as they think prudent to move at, when loaded. Hackworth's engine is capable of 10 to 12 miles per hour, when light. In returning with the empty cars, I found that at the greatest ascents, it required the whole power of the engines, and reduced their speed nearly one-half. This road is of wrought iron rails, in lengths of fifteen feet, which weighs 28 lbs. to the yard. From this rail road I proceeded to Newcastle-upon-Tyne, this place, with its neighboring Coal Mines upon the Tyne, is the birth place and cradle of rail roads and locomotive steam engines. It was in this vicinity that rail roads were first introduced, and it was at Killingworth, about five miles from Newcastle, the locomotive was first used to advantage.

"Killingworth is the residence of Mr. Wood, author of the treatise on rail roads. Letters with which the politeness of Mr. Stephenson furnished me previous to my leaving Liverpool, introduced me to Mr. Wood, who treated me with the greatest cordiality, and very kindly answered all the inquiries that my curiosity and invention could suggest, on the subject of rail roads and locomotive steam engines. The Killingworth rail road extends from the Collieries of that name, to the river Tyne, a distance of five miles. It was on this road that the plate rail was used at a very early period. The present road has been laid about twenty-two years, and is yet in pretty good order. The rails are of cast iron, with the exception of a small portion, which was laid of wrought iron, by way of experiment, about eight or nine years since. They have used the locomotive steam engine here 15 years.—It was here that Losh & Stephenson, first made their experiments on locomotives, and here Wood made most of the experiments recorded in his works on rail roads, which I am happy to find is considered as good authority in this country as with us. Mr. W. is now preparing a second edition of this work, which will comprise a great number of very interesting facts and experiments which his continued attention to the subject has developed. I saw these locomotives at work upon this road; they per-

formed much the same as those upon the Darlington and Stockton road; are of much the same construction as the three on that road. I have the particular dimensions of these engines, as well as those upon the Darlington and Stockton road.

"My next object was to visit the rail roads in the vicinity of Killingworth, and they are as common here as coal mines, which are to be seen in every direction. The most interesting of those visited, are the Springville and the Hetton roads. The Springville road is a recent work, in very fine order. The rails are of wrought iron, which is now altogether used in place of the cast. They use one locomotive upon this road, which performs much the same as those described. The Hetton road have laid by their locomotive engines, on account of the line of road being unfavorable for them.

"At North Shields I saw a rail road, part of which was laid much after our plan. It had been laid about 20 years, and was in very bad order, though still used.

"Previous to my parting with Mr. Wood, he gave me letters to a Mr. Buchanan and a Mr. Granger, of Edinburgh, my next object being to examine the rail roads in Scotland. These gentlemen are Civil Engineers, and Mr. Granger the superintendent of most of the rail roads now constructing in that quarter. They are constructing a rail road from Edinburgh to the Dalkeith Collieries, a distance of six or seven miles. This will be an expensive work, in tunnelling, cuttings and embankments.

"After spending a short time at Edinburgh, I went in company with Mr. G. to Glasgow, where he is superintending several rail roads, and had the pleasure of travelling with him over the whole length of the Kirkiuttiloch rail road. This road commences at the canal, about 9 miles from Glasgow, and extends into a coal region about eleven miles. Seven miles of this road have been in use about 18 months; the rest is just opened. They use animal power only on this road, but are constructing one from Glasgow to connect with the far end of this, eight miles in length, upon which they intend using steam locomotives. This is a heavy work; part of the cuttings and embankments are 40 to 50 feet in depth. These rail roads, together with those described in my last, comprise all the rail roads of importance in the kingdom. Several others are projected, and some minor ones are in progress. Upon the whole, the subject appears to be quite as popular here, as with us, notwithstanding they understand so much better than we do, the expense of constructing rail roads."—*Charleston S. C. Courier.*

Mr. Joshua Malin, a Topographical engineer with his assistants, have now got within a mile, or two of this place, locating a canal from the Ohio canal at the mouth of Big Sandy—it is intended to connect with the *Pennsylvania canal at the mouth of Big Beaver*. Mr. Malin says that this canal is quite practicable, with abundance of water at the summit, and can be made at a less average expense than \$10,000 per mile: the whole distance about 80 miles.—*Beaver Argus.*

The amount of the premium, which the state of Ohio obtained, on their late loan of \$1,200,000, of 4.07 per cent. amounts to the sum of \$48,840. So that for the state's obligation to pay, after the year 1850, \$1,200,000, we actually receive \$1,248,840.

This is understood to be the last loan necessary to be obtained, for completing the canals now authorized.

OHIO MAPS.

The editor of this paper has lately revised his Maps of the state of Ohio,—one large, upon the scale of 10 miles to an inch;—the other small, being drawn upon a scale of 40 miles to the inch; so that it is but little more than six inches square. It is beautifully engraved, and printed on bank note paper. Price 18 cents; or 12 cents if several are taken together.—Price of the larger ones \$1.50 each; or one dollar if several are purchased together. The canal routes are correctly delineated on both.

PERIODICAL LITERATURE.

THE editor and publisher of this paper is duly authorized to receive subscriptions, and to receipt for all moneys therefor, for the following works, published quarterly, each, at \$5 a year in advance, namely:

North American Review,
American Quarterly Review,
American Journal of the Medical Sciences.

—Also—

The following monthly publications, at \$5 a year in advance, namely:

Museum of Foreign Literature,
Journal of Foreign Medicine,
Religious Magazine.

—Likewise—

Franklin Journal and Mechanics Magazine;
at \$5 a year, in advance

All the abovementioned works are published in Philadelphia; excepting the *North American Review*, which is published in Boston.

—Likewise—

The Western Monthly Review,
Published in Cincinnati, at \$3 a year.
Columbus, Ohio, Sept. 1828

OHIO CANAL.

PROPOSALS will be received on the 14th day of November next, at Lancaster, for the construction of *Forty-three miles of Canal*, lying between the Licking Summit and Circleville.

Twenty-eight to thirty Locks, with two Aqueducts and a Dam across Walnut creek, are included in the work to be let.

Bidders, who are unknown as Contractors, to the Acting Commissioner, will be expected to accompany their propositions with recommendations of a substantial and unquestionable character.

Plans and specifications of the work may be seen at the office in Lancaster at any time after the 10th of November.

M. T. WILLIAMS,
Acting Commissioner.

Oct. 10, 1828.

the power to fill the canal, either partially or wholly with water, to draw off the water from a part or the whole of the canal; and to require it to remain empty, whenever it may be judged necessary to prevent or repair breaches, or to repair or construct other works or devices connected with the canal.

Although it is believed, that the power to manage and control these concerns, necessarily results from the authority granted by law to make and finish the canals, yet instances have occurred in which individuals have claimed the right to navigate those parts of the canal which have once been filled with water, and to fill any levels which they should find deficient in water, to the necessary depth to answer their individual purposes, without the consent of the Superintendent.

It is believed that at least two breaches have been occasioned by the closing of lock gates, and thus raising the water in the level above, without the consent of the Engineers and Superintendents in whose charge the locks were left. As this was done for the purpose of raising the water in the canal to the necessary height for navigation, and probably not with a design to produce mischief, it is at least doubtful whether the authors of this mischief are liable to the penalties imposed by the law, for unnecessarily and maliciously opening and shutting lock or feeder gates.

Much mischief may be done to the locks, bridges and banks of the canal by carelessness or wilful mismanagement in the navigation of boats, rafts or other floating substances, or by leaving open lock gates contrary to the orders of the Engineers or Superintendents, by those who are engaged in their navigation or management. The penalties imposed by the present law for such offences only attach themselves to the persons who actually commit the offence, and who are frequently transient persons, or wholly unable to pay the penalties imposed, or repair the damages occasioned by their misconduct.

The board attempted to remedy this defect, by passing an order which attaches the penalty to the boat in the navigation of which the offender is engaged at the time of committing the offence, in accordance with the well known maritime principle which is so universally adopted in such cases. This order also required the collector to withhold from the boat to which such penalty had attached itself, a clearance until the penalty should have been paid, as the only means of coercing the payment. Doubts have been entertained by some, of the authority of the board to make the order in question.

In order to prevent serious injuries to locks, bridges and other works connected with the canal, it seems to be necessary for the board to have full and ample power to regulate the kind and shape of boats, rafts or other water craft, which shall be permitted to navigate the canals.

The act for the prevention of injuries to the canals, provides that the Acting Commissioners, Resident Engineer, or Collector of tolls, may commence suits for the recovery of penalties imposed by that law for a violation of its penalties. A doubt has been entertained whether either of the persons authorized by law to collect such penalties, can appoint a general agent to commence suits in case of his absence. The provisions of this law are sometimes violated by transient persons, particularly the one which prohibits travelling on the banks of the canal, when neither of the persons expressly authorized to commence suits are at hand, and the offender consequently escapes, unless those who have the more immediate charge of that part of the canal can commence a prosecution.

The same statute provides that suits for these penalties, may be commenced before any justice of the peace in the county; but makes no provision for the service of the process of such justice beyond the limits of his own township.

To provide for punishing by indictment wilful violations of the laws for the protection of the canals is respectfully recommended as a more effectual

method of preventing the mischief in cases where the penalty cannot be laid upon the boat.

It sometimes occurs that persons to whom the state is indebted for work performed on the canals, are at the same time liable to the state for damages, occasioned by a breach of their contracts, or for injuries done to the canal by themselves, or others in their employment, and by their direction. It appears to be just and equitable to withhold from such persons, moneys due them until the damages sustained by the state from the same individual be liquidated and paid. An expression of the legislative will, in regard to these cases, would relieve the Acting Commissioners in many cases, from the unpleasant responsibility of acting without the express authority of law; and possibly be the means of preventing the loss of many just demands.

Some further legal provisions are believed to be necessary, in order to enable the board or the collectors to enforce the punctual payment of tolls. Should the General Assembly not deem it proper, at this time, to provide by statute for the whole subject in detail, it is desirable that collectors be authorized to seize and sell property on which the owner or his agent shall refuse to pay the toll; to withhold clearances from boats for a violation of the laws of the state, or orders of the board, by persons engaged in the navigation or management, as well as for the non payment of tolls; and to authorize collectors to administer oaths, to masters or owners of boats, touching their cargoes, passengers and the amount of tolls they may be liable to pay.

In accordance with the resolutions of the last General Assembly, the board have caused an examination of the Muskingum river to be made, and also a survey and examination of so much of the route of the proposed Pennsylvania and Ohio canal as is within this state.

As the plans and estimates of the Engineers predicated on those surveys and examinations have not been finished and submitted to the board, they are unable to present them at this time to the General Assembly. They will be made the subject of a subsequent report.

All of which is respectfully submitted,

ISAAC MINOR,
BENJAMIN TAPPAN,
N. BEASLEY,
JOHN JOHNSTON,
ALFRED KELLEY,
M. T. WILLIAMS,
A. BOURNE.

Columbus, January 5th, 1828.

APPENDIX.

A.—Is a schedule of awards to numerous individuals, therein named, of damages on the Miami canal: amounting, in all, to \$5,015 54.

B.—Is a similar schedule of damages allowed on the Ohio canal, north of the Portage Summit—amounting to \$2,667.

C.—Is a like schedule of damages allowed, by the board of appraisers, on the Licking Summit—amounting to \$1,223.—Grand total, \$8,921 54.

SPECIAL REPORT,

Of the Canal Commissioners, concerning surveys between Licking Summit and Ohio river, 17th January, 1828.

TO THE HONORABLE, GENERAL ASSEMBLY OF THE STATE OF OHIO:

The board of canal commissioners, in obedience to the resolution of the Senate and House of Representatives, of the 14th inst. calling for information in relation to the experimental surveys which have been made between the Licking summit and the Ohio river, subsequent to the original survey, and for a statement of their views and plan of future operations in relation to the progress of the work on said line; together with the donations which have been obtained within the counties of Pike and Scioto, respectfully submit the following statement:

The original survey, made in 1824, of this division of the canal line, was made under circumstances which necessarily forbid a minute examination of all the particular features of the country through which it passed; it was confined to the running of a single line without, in many cases, even an examination of the opposite side of the river. To obtain such information as would enable the board to determine upon a location of the canal which would comport with the economy and safety of the work, and at the same time protect and promote the interests of the principal towns and settlements through and near which it passed, a general re-examination of the valleys of Walnut creek, and of the Scioto river, were ordered; in the prosecution of these examinations many experiment lines were run, the results of which are given in the accompanying statement of the chief engineer, marked A.

Of the more important questions presented by these examinations, that between the experiment line on the south side of Walnut creek, and the corresponding line of 1824, has been decided by the board in favor of the new line; and that between the experiment line which crosses to the west side of the Scioto, above Chillicothe and its corresponding line of 1824, has also been determined in favor of the new line, so far as to fix the location on the west side of the river from the point which may be selected for crossing to a point opposite to Piketon.

To enable the Lancaster Lateral Canal Company to unite their proposed work with the main canal at an expense within their means, and thus promote the public interests by the increase of revenue to the canal which this cut will secure, as well as the particular interests of that town and the country connected with it, were amongst the leading inducements to make this change, which, notwithstanding it may add something to the cost of the work, is believed by the commissioners to comport strictly with the interests of the state.

In addition to the inducements to make the second change which were found in the more eligible line on the west side of the river, public justice and sound policy seemed to require that the canal should be so located as to protect and sustain the interests of the town of Chillicothe and the country immediately dependent upon it, as far as the nature of circumstances would admit. Liberal donations in aid of the work were also added to the inducements to make this change.

The location from the diverging point opposite Piketon, to the Ohio, has not been decided. The commissioners have found some difficulty in coming to a satisfactory decision on this question. To avoid the cost and hazard of recrossing the Scioto river, to secure an ample supply of water without exposing the canal to the power of that stream, and to secure generally a cheaper line, have been the leading objects in pursuing the examinations on the west side of the river: To protect the interests of the towns of Piketon and Portsmouth, and to secure to the canal a very eligible point for its junction with

the Ohio, and a good harbor in the river, are leading arguments in favor of the line on the east side of the river. A committee of the board has recently been appointed to examine the several lines which have been run, and, with such other members of the board as may find it convenient to attend, to make a final decision of all the questions connected with the locations of the canal through the lower part of this valley. This committee will attend to the duties assigned it, as early in the ensuing spring as the stage of the waters and other circumstances will admit.

A schedule of the donations which have been obtained within the counties of Pike and Scioto, is herewith submitted, marked B. These donations are all conditioned upon the construction of the canal upon the east side of the river; and those that are within or near the town of Piketon, upon the condition that the canal shall be constructed through that town.

Of the justness of the estimate put upon the value of the real estate, the commissioners have no means of judging; it is stated in the schedule at the value placed upon it by the donors. In most cases they have reserved the right of redeeming it at the estimate within a limited period after the canal shall be completed.

Assurances are made to the board, by the proprietors of land on the Ohio river, below the mouth of the Scioto, of liberal donations conditioned upon the construction of the canal on the west side of the river. It is expected that these assurances will be reduced to a specific form by the time which may be determined upon for the decision of the question.

In relation to the views, and plan of future operations of the board, it is proper to remark, that the first object has been to maintain such a course of operations as would effect, in the shortest time, a continuous line of navigation from Lake Erie into the heart of the state. In accordance with this view the first object of the commissioners has been to place under contract the entire line, north of the Licking summit, and to get the work so advanced as to insure its completion, if practicable, within the ensuing season; but if not within that time, by the commencement of the business doing season of 1829.

The important results to the interests of the state and to the people of her vast and productive interior, which will be secured in the accomplishment of this great object, will at once be perceived, and will it is believed, justify the board in the course which has been pursued.

The course of future operations is marked out in an order of the board which has been made, directing the acting commissioners to make immediate preparations for putting under contract within the ensuing season, the line from the Licking summit to the point which may be selected for crossing the Scioto river, and including said crossing; and to put under contract between this and the first day of June next, an aqueduct across the river, a dam for a feeder, and such other portions of the canal connected therewith, as they may think will promote the interests of the work. Under this order it is expected that as much line will be put under contract, by the first day of June, in connection with the aqueduct and dam, as may be properly entrusted to one superintending party.

The first contracts south of the summit, have been ordered to be made at the point suggested, with reference, not only to the important character of the works necessary for crossing the river, and supplying water to the canal below, as well as the time required for their construction, but with the view, mainly, of favoring the progress of the work at the deep cut, and in the valleys of the Licking and Tomaka creeks, by withholding that competition for labor, which must injuriously affect the progress of the important works at and north of the summit, if contracts should be immediately made in that vicinity. In the latter part of the season the work north will have progressed so far as not to be materially retarded in its progress by the commencement of

work in the valley of Walnut creek. The time which may be fixed upon for the completion of the work at, and in connection with the crossing of the Scioto, will be applied to the contracts to be made between that point and the summit, in order that the whole of this line may be completed and used at the same time.

The remaining line to the Ohio river, will be prepared in the course of the season, and will be let to contractors at as early a day as, in the opinion of the commissioners, it can be done without interfering with the progress of the work, which at that time may be under contract.

Respectfully submitted,

ISAAC MINOR,
BENJ. TAPPAN,
N. BEASLEY,
JOHN JOHNSTON,
ALFRED KELLEY,
M. T. WILLIAMS,
ALEXANDER BOURNE.

Columbus, January 17, 1828.

A.

Honorable Board of Canal Commissioners:

GENTLEMEN—

In obedience to a request of your board. I offer the following statement of surveys made along the valleys of the Walnut creek and Scioto, subsequent to the original survey of those valleys, made in 1824; the time when these subsequent and subsidiary surveys were made is not regarded, but they are noted in the order in which they occur on the line.

No. 1. This deviation begins in the original line, $4\frac{1}{2}$ miles below, or west of the Licking summit, at a lock numbered 8, and at station of the original line numbered 146: It extends across and down the Walnut creek, and again meets the original line by recrossing, by means of a dam, from which an acquisition of water is obtained.

The length of new line is 9 miles 54 chains, cost,	90,416 01
The length of original line is 9 miles 14 chains, cost,	84,001 73

Difference in favor of old line,	6,4 4 28
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A small extra acquisition of water will be had by this deviation, and an estimate connection with the Hocking valley, by means of the Lancaster canal.

No. 2. This deviation from the original line begins a short distance south of Walnut creek, near where it is crossed by the road leading from Columbus to Chillicothe, at a station in a line of 1824, numbered 620; and passing Circleville on its west side, extends down the valley of the river to a station in the line of 1824, numbered 771, standing near the lower end of Pickaway plains, and near John Barr's; thence to the Scioto, which it crosses a short distance below the mouth of Yellow Bud creek.

Distance on lines of 1824 and 5, 13 miles 30 chains, cost,	97,207 33
Do. deviation line, 12 do. 79 do. cost,	84,425 21

Difference in favor of new line,	12,782 12
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One of the results produced by this deviation is apparent from its cheapness; another, and which is of more consequence, is its being laid in lower

ground, where the facilities of acquiring water are greater, and also the power of retaining it, the line being a part of the way in a prairie, so low as to afford some water, yet not so low as to be inundated by the floods of the river.

No. 3. This deviation begins in the line of the foregoing, at station numbered 771; and crossing the Scioto at the same point as is therein described, 'a little below the mouth of Yellow Bud,' descends the valley of the Scioto on the west side of the river, to a point near Piketon, thence recrossing the river, ends in the line of 1824, at that place.

Length of original line 42 miles 12 chains, cost,	386,129 26
Do. of new do. 42 do. 60 do. cost,	380,990 88

Difference in favor of new line,	6,138 43
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By a comparison of the nature and firmness of the soils on which these locations were made, it appeared that the location on the west side of the river was on the safer and more favorable ground. The bluffs at Kinnikinnik and below, are very unfavorable for the site of a canal; and the bluffs and slipping banks at Hough's mill below Chillicothe, present uncommon difficulties and danger: Add to this a long line of steep side lying bank, on which a canal should not be built, while a better site is at hand. A continuation of difficulties would meet us from a point nearly opposite the lower part of Chillicothe, till we could rise to Kilgore's plain, several miles. Another important object will be attained on this change of line, viz: The use of Paint creek as a feeder, which could not have been obtained on any other line, and which produces more water than any other stream emptying into the Scioto.

No. 4. This deviation begins at station number 620, being the beginning point of deviation No. 2, and extends along the line pursued by that survey, to a station near Circleville, numbered 784; and then diverges from that line, and crosses the Scioto at Nevill's dam, to the west side of the river, and passes thence down the valley to the crossing a little below the mouth of Yellow Bud.

Distance on either line nearly the same, cost new line,	126,020 74
Cost, line of 1826,	105,021 98

Difference between two new lines,	20,998 76
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No. 5. This survey begins in the line of No. 3, at a point nearly opposite to Piketon, and at station numbered 1938, and passes down the valley of Scioto to the Ohio river at Portsmouth, having passed through the Scioto at that place. (west side.)

Distance 29 miles 19½ chains, cost,	267,507 16
Distance, east side, 29 miles 23 chains, cost,	315,182 09

Difference in favor of line west side river,	47,674 93
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No. 6. From a point in the survey last described, about a mile from Portsmouth, the line of canal from station 1938, was continued to a place called the Ship-yard, on Ohio river.

Length of this line from 1938, 32 miles 65 chains, cost,	277,321 18
Line on east side of river,	315,182 09

Difference,	37,860 91
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No. 7. From a point in the survey to the Ship-yard, as last noted, a line of survey was made to Burris' farm, and Ohio river, a little below the mouth of Turkey creek.

Length from 1938 to Burris', 36 miles 12 chains, cost,	302,402 38
Low line east side of river,	315,182 09

Difference,	12,780 71
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No. 8. A survey was made in 1827, from a point above Circleville, to and across the Scioto, combining with the line described in number 4, at Nevill's dam; this line is of about the same distance, as that of No. 4, but difference of expense against it is per estimate, 3,892 45

A number of other surveys have been made, by way of experiment, and with a view of arriving at the greatest certainty on the subject, that it can at all present; those made for this purpose have been discarded as soon as it was found that by pursuing them, we would incur additional expense, without deriving benefit.

The line of 1824, east side of Scioto, from the Licking summit, is 121 miles and 4 chains long, estimated cost, 993,207 91

Line of canal, by adopting the west side of Scioto, from a point near Circleville, and the south side of Walnut, from lock No. 8, or station 146, to station 262, is 112 miles and 51 chains to Portsmouth, estimated cost, 984,126 70

9,081 21

Respectfully submitted,

DAVID S. BATES, *Principal Engineer.*

January 16, 1828.

B

Is a schedule of donations to the canal fund, in town lots, and other property, proffered upon the condition that the canal shall be constructed, from Piketon to Portsmouth, on the east side of the Scioto river:—amounting, as estimated by the donors, to, \$61,898 33

But which is not available, as the canal commissioners have decided upon continuing the canal, from Chillicothe, to the Ohio, on the west side of the Scioto river.—*Editor.*

SPECIAL REPORT

Of the Canal Commissioners, respecting surveys of the Muskingum river; and the Pennsylvania and Ohio Canal.

TO THE HONORABLE, GENERAL ASSEMBLY OF THE STATE OF OHIO:

The Board of Canal Commissioners now respectfully submit the following report, in relation to the survey and examination of the Muskingum river, and the examination and location of the route of the Pennsylvania and Ohio Canal within this state.

In relation to the Muskingum River.

The Board in accordance with the resolution of the last General Assembly, made arrangements for taking the levels and making the surveys and examinations, necessary to ascertain the best plan and probable cost of improving the navigation of that important river.

Mr. Joseph Ridgway, jr. was accordingly directed to proceed to the performance of this service, as soon as he could be spared for that purpose, without detriment to the work in which he had been previously engaged. In the skill and intelligence of this gentleman the Board feel great confidence, and no doubt is entertained that his levelings and surveys are substantially correct.

The estimates of the proposed improvements, which are based on the survey and examinations of Mr Ridgway, have been made under the immediate superintendence of the principal Engineer, David S. Bates Esq. and are herewith presented to the General Assembly. These estimates are very liberal as to the prices affixed to the work, and no doubt is entertained that with economical management, the actual expense of the proposed work may be brought within the estimated cost.

In adopting a plan for improving the navigation of the Muskingum, the size of the river, the nature of the valley, its banks and bed, and its connection with the Ohio, have been taken into view. The commerce of the Ohio river is now carried on principally by means of steam boats, and it is probable that this will ever be the case, particularly as the removal of obstructions, occasioned by the Falls at Louisville, will enable the same boats to pass uniformly, in the ordinary stages of the water, from Pittsburgh to New Orleans. As the improvement of the Muskingum is designed, among other advantages, to connect the navigation of the Ohio river with that of the canal, through the valley of the Muskingum, it is of primary importance that the improvements should be such as to afford a commodious navigation, either for boats of the canal, or the steam boats of the Ohio.

The character of the valley, and the channel of the Muskingum, render it much cheaper to make a steam boat navigation in its channel, than a canal along its margin. The plan of improvement therefore, which has been adopted, is to create at all places in the channel of the river, by means of dams, sufficient depth of water to admit the passage of steam boats of the size found most profitable for navigating the Ohio river, and to construct the locks and side cuts round the dams, of sufficient dimensions for that purpose. The channel of the river is sufficiently large for the convenient navigation of the largest steam boats; being, on an average, 500 feet in breadth.

The distance from Zanesville to the mouth of the river at Marietta, following the meanders of the river, is 75 miles and 66 chains. The whole amount of fall from the foot of the upper dam at Zanesville, to the level of low water mark, in the Ohio at Marietta, is 104 feet and thirty-two hundredths; and from the top of the Zanesville dam 115 feet and thirty two hundredths. To make slack water throughout this whole distance, of not less than 4 feet in depth, at the lowest stages of the water, will require eleven dams across the river. The descent from the lower bridge at Zanesville, may be overcome by 12 locks; the aggregate lift of which will be 104 feet and 32 hundredths. Of the eleven dams required by the proposed plan, nine may be founded on rock, and two must be built on gravel foundations.

The total estimated cost of making the proposed improvements from the lower bridge in Zanesville to the Ohio river, including ten per cent. on the net estimate to cover unforeseen expenses, is \$353,443 67.

In order to connect the navigation of the Ohio river with the canal, it will be necessary to improve the river between Zanesville and Dresden, by the erection of one dam across the river, between these two places, near Col. Jackson's salt works, and the making of a lock to overcome the fall; together with a lock and an increase of the breadth of the canal at Zanesville. The total cost of which is estimated at \$56,556 61.

A side cut or branch canal of about $2\frac{1}{2}$ miles in length from the main canal, to the Muskingum at Dresden, with three boat locks, overcoming a descent of about 28 feet from the canal into the river, will also be necessary to perfect the plan.

The cost of this side cut and locks has not been precisely ascertained: it will not, however, vary materially from \$35,000 00, which amount will be nearly refunded to the state, by the value of the donations, offered on condition of constructing the work. This is also the most advantageous point for

using the surplus waters, which must be discharged from the lowest level between the Portage and Licking Summit.

The total descent from the lower level of the Ohio canal near Dresden, to the level of low water in the Ohio river at Marietta, is $158\frac{1}{2}$ feet. From low water mark in the Muskingum at Dresden, to low water mark in the Ohio river at Marietta, is 129 67 100ths feet. The total distance from Dresden to Marietta, following the course of the river, varies but little from ninety miles.

The estimates herewith presented are predicated upon the plan of building the locks and abutments of the dams of stone masonry, of the same description with that used in the locks on the canals now making in this state; the proposed dimensions of the chambers of the locks, are 150 feet for the length, and 34 for the breadth.

No doubt is entertained of the entire practicability of the plan, nor of the utility of the improvements when made. It is believed that the water power created by the erection of the proposed dams will, in the aggregate, fully compensate the expense incurred in their construction. If then the commercial business on the river, can be made to pay the interest on the cost of the locks and side cuts, and to keep them in repair, of which there can be little doubt when the Ohio canal shall have been completed, the proposed work offers a profitable investment for capital.

Of the proper time and manner of providing the means for the accomplishment of this desirable object, whether by the incorporation of a joint stock company for the whole work, or of separate companies for different parts, or by undertaking, at the proper time, the whole work at the public expense, and for the public benefit, is for the wisdom and discretion of the General Assembly to determine.

In relation to the Pennsylvania and Ohio Canal.

The survey and location of so much of the route of this proposed canal, as is within the limits of this state, was commenced by Sebried Dodge, Esq. in the month of October, and finished in the month of December last.

From the experience which Mr Dodge has had, as an Engineer, for three years past, in the actual construction of part of the Ohio canal, as well as from his science and intelligence, the Board are warranted in placing full confidence in the general correctness of his examinations, plans and calculations. The shortness of the time employed in these surveys precluded the possibility of ascertaining, with minute accuracy, all the topographical facts, of minor importance, connected with the location. Still, however, enough has been ascertained to determine the practicability of the proposed work, and to afford data for estimates on its cost, which cannot vary very materially from the truth.

The route within this state has been found fully as favorable as was anticipated; and it has been ascertained beyond doubt that the Summit, as well as the lower levels, can be abundantly supplied with water.

Commencing at the village of Akron, where the proposed Canal will unite with the Ohio canal in a large and commodious basin, the line pursues an eastwardly direction, crossing the little Cuyahoga in the village of Middlebury; thence in a northeastwardly direction through the township of Tallmadge until it approaches near the main Cuyahoga at the centre north and south road in the township of Stow, thence continuing nearly the same general course along the south and southeast bank of that river until it passes the village of Franklin, it enters the immediate valley of the Breakneck creek or south branch of the Cuyahoga, and passing up that valley in an eastwardly course, it crosses the summit between the waters of the Cuyahoga and Mahoning branch of Big Beaver about half a mile southeast of the village of Ravenna. The line then descends rapidly into the valley of the west branch

of the Mahoning river, crosses that stream near its southwestwardly bend, continues along its north bank re-crossing that branch and also the south or main branch a mile above the junction of those streams; then leaving the immediate neighborhood of the river, the line pursues an eastwardly course, again approaching the river opposite the village of Warren, and then continues in the immediate valley of the river on the right bank, in a southeastwardly direction to the line between the States of Ohio and Pennsylvania.

Some deep cutting occurs in the swamp near the village of Middlebury: the whole extent in length which exceeds proper cutting is upwards of a mile: the average depth about $12\frac{1}{2}$ feet. An embankment of considerable magnitude is necessary to sustain the level of the canal across the valley of the Little Cuyahoga in the village of Middlebury. The greatest elevation of this embankment is twenty feet to bottom of canal; the whole will contain about 34,000 cubic yards.

The object in view in the location of this part of the line, was to adopt such a level as would preserve a proper medium between excessive deep cutting on the one hand, and of too high an embankment on the other; one or both of which difficulties to a greater or less extent it is necessary to encounter.

After leaving the village of Middlebury, the line passes over a tract of uneven and in some places steep sideling ground, for about one and a half miles, requiring some deep cutting and considerably extensive embankments across ravines or on side hills. The earth is however of a character to be easily removed, and is of good quality for canalling.

Continuing thence northeastwardly, the face of the country and elevations are remarkably well adapted to make a cheap and safe canal, until the line approaches the Cuyahoga in Stow. Between Stow and Franklin the line passes along a side hill sloping northwardly toward the river; in some places steeper than could be desired, in others nearly level or sloping so gently as to present a very favorable location. This part of the line is intersected by several ravines, two or three of which are of considerable depth; and one, the valley of Plumb creek, is six chains in breadth, requiring a large embankment.

Near the village of Franklin a small amount of sand-stone rock excavation will occur. As the slope of the ground is here very gentle, affording an opportunity of choosing the location, a large amount of rock excavation may be avoided, although the rock approaches near the surface.

It is proposed to cut down the summit near Ravenna twenty-seven feet at the highest part of the ridge. The whole extent of the deep cut at this place will be sixty six chains in length, and its average depth below the natural surface seventeen feet and eighty hundredths. As the length of the deep cut is not great, and the earth appears favorable for the operation, it is even questionable whether good policy will not require reducing the summit level still lower. Every foot of reduction in the elevation of the summit will of course save double that amount of lockage, will aid the supply of water by diminishing the expenditure, and will afford greater facilities for the construction of feeders and reservoirs.

The only difficulties encountered between the summit level and the state line worthy of notice are the wash banks, which the river on one side, and the hill or table land on the other, render it impossible to avoid. These banks necessarily enhance the expense of construction and increase the danger to which the canal will be exposed when made. The aggregate length of these banks, is not greater than must ever be expected in following the vallies of rivers—nor is their character peculiarly unfavorable. It is estimated that the united length of banks requiring to be protected against the current of the river will be two miles forty-seven chains.

It is proposed to supply the summit level of the canal with water by the following means:

1st. *By a feeder from Breakneck Creek.*—This stream may be introduced by a feeder of three miles six chains in length, and is sufficient for the supply of the summit level and the contiguous levels, in ordinary seasons, during more than one half of the year. In the dryest seasons, when the flow of water is reduced to the least quantity it yields about two hundred and forty cubic feet per minute. The quantity of water in this stream may be considerably increased during dry seasons, by using the lake at its head as a reservoir; retaining its waters in the wet season and letting them flow in the dry.

2d. *By forming reservoirs of four lakes or ponds situated near the summit.*—These bodies of water, Muddy Pond, Sandy Pond, Brady's Lake and Lake Pippin, may be easily converted into valuable and convenient reservoirs for the supply of the summit and the adjacent levels. The two former will contain an area of about two hundred and forty acres, when the water is raised to the contemplated height. Water to the depth of twenty feet, or even more, may be accumulated, retained and drawn off from these ponds for the use of the canal, and conducted into it by means of a feeder of seventy-eight chains in length. A depth of eight or ten feet of water on the area of Brady's Lake and Lake Pippin, may be made available to supply the canal in dry seasons. These two lakes will together contain an area of about two hundred and seventy acres. The two former ponds may be filled with water to any desirable height, by conducting a branch of the Breakneck into them by a short feeder, and the two latter by means of the proposed feeder from the main Cuyahoga.

It is computed that three hundred and twenty-five million cubic feet of water may be reserved for use in these reservoirs, which will admit a uniform flow into the canal of upwards of eleven hundred cubic feet per minute for two hundred days, before it will be exhausted.

3. *By a feeder from the Main Cuyahoga.*—The waters of the Main Cuyahoga may be conducted into the summit level of the canal by a feeder of seven miles sixteen chains in length. The quantity of water running in the river at the place from whence this feeder is to be taken, may be computed at from 2,800 to 3,000 cubic feet per minute in the dryest season.

Although the waters of the Main Cuyahoga alone are probably sufficient to supply the summit level of this canal and the lower levels dependent on receiving a supply from the neighborhood of the summit; still it is desirable to draw only so much water from the Cuyahoga as may be absolutely necessary, and to rely as much as possible on the other sources. Vast injury must result to the owners of mills, manufactories, and mill privileges, and to the country, to which the water power of the Cuyahoga is of incalculable value, from diverting into any other channel a considerable portion of its waters in dry seasons.

In descending eastwardly from the Ravenna summit, a small supply of water may be obtained from the west branch of the Mahoning, about three miles from the summit; and as the canal descends the valley of that stream, its accumulated waters with that which has escaped from the canal by leakage may be brought into the canal. About twenty miles eastwardly from the summit it is supposed that a feeder from Silver creek, the most durable branch of the Mahoning, may be introduced; and at Warren the whole volume of the Mahoning river, in dry seasons, may be brought into the canal, if desirable.

By an economical and proper use of the means of supplying the canal with water, above described, it is confidently believed that it will not be necessary to divert from their natural course any considerable part of the waters of the Cuyahoga.

The length of the line of this canal, as located, within the state of Ohio, is as follows:

From Akron, (Portage summit of the Ohio canal) to Ravenna summit,	22 miles 79 chains
From Ravenna summit to Warren,	28 do. 16 do.
From Warren to Pennsylvania line,	24 do. 58 do.
Total length of canal line,	75 miles 73 chains.

Length of Feeders.

Cuyahoga feeder,	7 miles 16 chains
Muddy and Sandy Pond do.	78 do.
Breakneck feeder,	3 do. 06 do.
Warren do.	12 do.
Total	11 miles 32 chains.

Aggregate length of canal and feeders, 87 miles 25 chains.

The estimated cost of Canal and Feeders, is as follows:

Cost of main canal from Akron to the Pennsylvania line, is,	\$683,762 69
Feeder from the Main Cuyahoga, including reservoirs at Brady's Lake and Lake Pippin,	50,932 95
Reservoir and feeder from Muddy and Sand Lakes,	20,249 24
Feeder from Mahoning at Warren,	4,031 00
Breakneck feeder,	5,397 10

Aggregate cost of canal, reservoir and feeders, \$764,372 98

The foregoing estimates were made under the immediate inspection and advice of the Principal Engineer. The amount includes ten per cent. on the nett estimate for the unforeseen expenses, and it is believed will fully cover the actual expense of the work,

The total ascent from the Portage to the Ravenna summit is 101 feet.

Total descent from the Ravenna summit to the Pennsylvania line, is, 242 $\frac{12}{100}$ feet.

Whole amount of lockage, 343 $\frac{12}{100}$ feet.

To overcome this rise and fall, there have been located 36 locks, of which 11 are west and 25 east of the Ravenna summit.

Of the commercial importance of this canal, when finished, no doubt can be entertained by those who understand the interests and geography of our country; the route passes through one of the best settled and most wealthy districts of our state; and when executed, it will, together with the Ohio canal, open a direct and convenient channel of commerce between the interior of Ohio, and the great manufacturing and commercial city of Pittsburgh, together with the whole West Pennsylvania. Between these sections of country an extensive and highly beneficial commerce now exists, which must increase with the growing population of our common country, and with the development of its resources.

It is however only by looking forward to the time when the Great Pennsylvania canal, in the construction of which, that state is now engaged, and the contemplated Chesapeake and Ohio canal, shall have connected the Chesapeake with the Ohio river, the Potomack, and the Delaware, that the importance of the Pennsylvania and Ohio canal can be duly appreciated.

When these great works shall have been executed, the farmer in the centre of our state, may put the productions of his fields on board of a boat which will convey them to Washington, Alexandria, Baltimore or Philadelphia, without unloading or re-shipping; and the merchant may bring his goods from either of those cities to his own door, without risk or change in the

method of transportation, and for an expense not exceeding one third of the present cost.

Through the northern part of the *Ohio canal*, the proposed *Pennsylvania and Ohio canal*, and the *Chesapeake and Ohio* or the *Pennsylvania canal*, a direct intercourse between the great Lakes of the north west on the one hand, and the Delaware and Chesapeake Bays and Atlantic Ocean on the other, will be carried on to an immense extent.

To the interests of Pennsylvania, and of those engaged in the Chesapeake and Ohio canal, as well as to Ohio, the proposed canal is of the first importance. It is the most advantageous route between Pittsburgh and Lake Erie—the most direct from the western parts of Lake Erie, Detroit, and the northwestern Lakes to Pittsburgh, Philadelphia and Baltimore—it unites with the navigation of Lake Erie, at a point further west, and longer clear from obstruction by ice than any where in Pennsylvania; and above all it intersects the Ohio canal before it strikes the Lake, and by that means precludes the necessity of transshipment, and avoids the danger of Lake navigation, as it respects the commercial intercourse between the state of Ohio and the ports of the Delaware and Chesapeake.

Should the Pennsylvania and Ohio canal be completed, we shall see an active commerce carried on between the city of Pittsburgh and the western part of Pennsylvania, on the one hand, and the country bordering on the Ohio river below the mouth of Scioto on the other, through that canal and the Ohio canal, during those seasons when the water in the upper part of the Ohio river is too low for steam boat navigation.

The profit of this work to the proprietors must be commensurate to its commercial importance; and it is believed to offer one of the best opportunities for a profitable investment of capital that can be found in the United States.

Respectfully submitted,

ISAAC MINOR,
BENJAMIN TAPPAN,
NATHANIEL BEASLEY,
JOHN JOHNSTON,
ALFRED KELLEY,
M. T. WILLIAMS,
A. BOURNE.

Columbus, January 17th, 1828.

SPECIAL REPORT,

*Of the Canal Commissioners concerning the Reservoir, upon the Licking summit.
The Hon. Speaker of the House of Representatives:*

The board of canal commissioners, in obedience to a resolution of the House of Representatives, of the — instant, calling for an estimate of the probable cost of clearing the timber from the reservoir connected with the Licking summit level of the Ohio canal, respectfully submit to the House of Representatives the following estimate:

From a survey which has recently been made, it appears that the area which will be covered by the water of the reservoir when filled, contains upwards of two thousand four hundred acres: The quantity of land included within the level of top water line, which is covered with heavy timber, is probably twelve hundred acres, the clearing of which is estimated at \$8 per acre,

\$9,600 00

The quantity which is covered with a light timber and under brush is probably five hundred acres, estimated at \$3,

1,500 00

\$11,100 00

The remainder of the area is lake, and open swamp, with a growth of very light brush.

By order of the board,

ISAAC MINOR, *President*
of the Canal Board.

Columbus, January 17, 1828.

Extract from a report of the Auditor of State, of the 28th of Jan. 1828.

It will be seen by the foregoing report, that the amount which will probably be collected in 1827 for canal purposes, is estimated at, 84,016 47 7

The amount required by the canal fund commissioners, to pay the interest on canal loans for 1827, was 70,000 00 0

Leaving a balance of tax collected for canal purposes, over and above the amount required by the fund commissioners as aforesaid, of 14,016 47 7

The amount of money paid into the treasury from the sale of town lots in Akron, for canal purposes, 483 45 0

The balance in the state treasury due the canal fund from collections for the year 1826, 48 34 0

The amount of money in the treasury applicable to the payment of interest on canal loans for the year 1828, is \$14,548 26 7

The amount required by the commissioners of the canal fund for the payment of interest on sums borrowed for the year 1828, is 123,000 00 0

The amount to be raised the current year, for the purpose of forming a sinking fund for the final redemption of the sums borrowed for the canal, is 10,000 00 0

Total amount necessary to be raised for canal purposes for the year 1828, 138,000 00 0

Deduct the surplus money in the treasury for canal purposes, after the payment of interest required for the year 1827, as above stated, of 14,548 26 7

The amount necessary to meet the balance of interest and the sinking fund for 1828, is 123,451 73 3

A tax of one mill and a half mill upon the dollar assessed for canal purposes for the year 1828, would nett the sum of 35,000 00 0

There would then be a balance wanting to meet the aforesaid interest and sinking fund, of 38,451 73 3

Should the Legislature conclude to appropriate the surplus money in the treasury, say 40,000 dollars, for the payment of interest on canal loans no greater or additional per centum would be necessary to meet the interest required for 1828 and the sinking fund, than was levied for the year 1827, independent of the estimated receipts by the canal commissioner from tolls and donations.

If, however, it should be thought advisable not to appropriate the surplus in the treasury for the purpose aforesaid, the per centum which the auditor of state is authorized to cause to be levied to meet the aforesaid interest and sinking fund, will be two mills and a half mill upon the dollar.

CIVIL ENGINEER,

AND

HERALD OF INTERNAL IMPROVEMENT.

PUBLISHED WEEKLY, BY JOHN KILBOURN, AT \$3 A YEAR, IN ADVANCE.

VOL. I. COLUMBUS, OHIO, SATURDAY, NOV. 1, 1828.

NO. 20.

Readers will notice that the Ohio Canal documents are continued on the third page of every number, from the last page of the preceding number.

Extract from the ninth edition of the Ohio Gazetteer, now preparing for the press—
article on finance.

Financial Statistics.—By the returns of the several county Auditors, in 1827, it appears that there were then, (exclusively of two or three small counties, which made no return,) the following amounts of taxable property, in the state;

Land, 15,336,124 acres, valued at	\$39,770,885
Town property	7,356,487
Mercantile capital	3,334,978
Pleasure carriages, 129, valued at	21,080
Horses, 154,149, valued at	6,175,960
Cattle, 315,830, valued at	2,773,907

Total valuation	\$59,433,297
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Which, in round numbers, may be called \$60,000,000.

Upon this amount of property, the following taxes were paid, namely,

For state and canal purposes	\$188,047
County purposes	193,447
Township do.	34,404
Road do.	44,479
School do.	7,675

Total, under state authority, \$473,052
Which sum averages, nearly eight mills upon the dollar.

The amount of taxes, which the people of Ohio paid to the general government, the same year, cannot be ascertained, with the same degree of accuracy: as these are paid in the way of duties or assessments upon foreign goods, imported for domestic consumption; called, by financiers, indirect taxes. But the amount can be ascertained, within a few thousand dollars, by the following positions.

1st The people of Ohio, constitute one sixteenth part of the total population of the whole Union; as will appear, by reference to the official returns of the last census.

2nd The people of Ohio, unquestionably, consume as large a quantity of dutiable foreign articles as an equal average number of people, in any other part of United States. Consequently,

3rd They pay the one sixteenth part of the whole revenue of the general government.

The amount of this revenue, according to the average of the years 1826 and 1827, omitting fractions, was \$24,000,000 a year: the sixteenth part of which is \$1,500,000, for the state of Ohio's quota:—and, to which we may safely add 20 per cent. for mercantile profits, which the venders of foreign goods impose, equal to \$300,000 more, which will make the

sum of \$1,800,000, which the people of Ohio pay annually, toward the support of the general government.

About \$1,000,000 of the \$24,000,000, is, however, derived from the sale of public lands: the one sixteenth part of which, \$62,500, should be deducted from the above \$1,800,000; but then the mercantile profit, on the original amount of duties paid, is, probably, put down, at as much less than is really is, as this amount.

The total amount of taxes, which the people of Ohio paid during the year 1827, was,

For all state purposes	\$473,052
To the general government	1,800,000

Total amount, per annum, \$2,273,052

Or say, in round numbers \$2,000,000 which is as low as have most certainly been paid, for several years past; and as low as will probably be hereafter paid, annually.

Comment.—If the people of Ohio would bear an additional tax, for only about two years; or at most, for only three years, equal to that which they constantly pay to the general government without any complaint, the sum so raised would pay off the whole principal and interest, of the money borrowed to construct and complete both canals.

In this number is completed the publication of the public documents relating to the Ohio canals. It is a matter of felicitation that we have now embodied, in one volume, for convenient reference the official history of these great works of public improvement, down to the present year.

This paper will be suspended, for a few weeks, perhaps until the meeting of the legislature, in December, when the seventh annual report of the Board of Canal Commissioners will be prepared, so that we can present it to our readers, in a continuous manner, in connection with all the preceding reports, and other documentary matter, relating thereto.

A title page, and an index to this volume will be forwarded to subscribers: so that they can stitch the several numbers now published, title and index together, so as to make the work convenient for reference: but it is recommended to them not to get the volume bound, until the publication of the six subsequent numbers, to complete the first volume, or half year; which will embrace the several reports and other official matter relating to

the canal, which will be published during the ensuing session of the Ohio legislature; so as to have the history of them down to the commencement of the year 1829 complete, bound in one volume.

As the canals have cost much money; so that many wise and patriotic citizens have doubted the correctness of the policy of embarking in the great work of their construction; and as it is interesting to all, both friends and enemies of the measure, to know, accurately their cost, both in the aggregate and in detail, particular attention has been paid to the insertion of all the financial papers connected therewith.

It has been deemed proper to insert the reports of the Canal Commissioners, concerning the Pennsylvania and Ohio Canal, and also relating to the navigation of the Muskingum river, from the main canal at Dresden to Marietta; as they are parts of the grand system of internal intercommunication; although they are not, immediately embraced, in the primary object of uniting the Ohio river with Lake Erie—but are intended to be constructed by private companies, which have been incorporated for the purpose.

The following article is from the American Mechanic's Magazine: published in New York, in the year 1825.

CANAL BOATS.

GENTLEMEN:—With the single view to public improvement, I propose to submit to you some remarks on the *proper form of boats for navigating the canals of this state*.

In the first place, I lay it down as a truth, derived from experience, theory, and reason, that the form of a boat for navigating shoal and narrow bodies of water must necessarily be very different from that best adapted to the navigation of deep and ample expanses of water. In a canal, it is of the highest importance, to pass with the least possible agitation of the water, because this injures the banks less, and the less the waters are agitated by the passing boat, the more easily it moves, with any given velocity.

This proposition is undeniable; in a canal where we have always smooth water, we have only to seek the best form of boats for passing easily; whereas, on large rivers, we must consult the means of security from waters made rough by winds and waves.

These circumstances being duly considered, as premises, we come next to consider the best possible form of a boat for canal navigation. Were we not circumscribed in the length of a boat, by that of the locks, the desideratum, in this case, would be perfectly plain, viz: to build sharp, fore and aft, giving a long cut-water taper, and making the stern shape the

same as that of the bow. This is common practice, and I believe conformable to philosophical principles.

Let us consider that when the bow parts the water, its opening columns, on each side, pile against and under the sloping sides of the vessel, and thus exert a force to raise the bow above the level of the stern, which makes the course of the vessel uniformly up a plain, more or less inclined, according to the velocity of the vessel.

To make this appear, it is only necessary to observe the effect produced by towing a small boat at the rate of 6, 8, 10 or 12 miles per hour, at the stern of a vessel. The principle is the same in all degrees of velocity, but is more clearly exhibited in the extremes.

In applying these remarks to the construction of canal boats, let it be remembered that this swell at the bow and the dead water astern, both retard the motion of the boat, and cause that agitation which is so injurious to the banks of a canal; therefore, the true desideratum is a form of boat that, with any given velocity, shall pass with the least possible swell at the bow, or dead water astern, and the least possible agitation of the water, abreast and in the wake.

As my object is a public one, discussion is desirable. If I advance any thing which is not perfectly sound, do me the justice to believe that I shall be glad to see it exposed in your columns. This subject is one of great importance, as is known to all who have witnessed the injury done to our canals by packets, and will be obvious to those who have not witnessed it, on considering, that the increased rates of toll on them is produced by this injury.

I assert, and think I shall be able to demonstrate, that canal packets may be so constructed, as to run much faster than any now on these canals, and do much less injury to their banks. They are very badly formed, and have richly merited the doom fixed upon them by the Canal Commissioners, in their late tariff of Tolls. S.

PERIODICAL LITERATURE.

THE editor and publisher of this paper is duly authorized to receive subscriptions, and to receipt for all moneys therefor, for the following works, published quarterly, each, at \$5 a year in advance, namely:

North American Review,
American Quarterly Review,
American Journal of the Medical Sciences.

—Also—

The following monthly publications, at \$6 a year in advance, namely:

Museum of Foreign Literature,
Journal of Foreign Medicine,
Religious Magazine.

—Likewise—

Franklin Journal and Mechanic's Magazine;
at \$5 a year, in advance.

All the above-mentioned works are published in Philadelphia; excepting the *North American Review*, which is published in Boston.

—Likewise—

The Western Monthly Review,
Published in Cincinnati, at \$3 a year.
Columbus, Ohio, Sept. 1828.

REPORT,

Of the Finance Committee of the House of Representatives; and which was adopted by the Senate, with only one or two verbal alterations.

Mr. Hayward, from the committee on Finance, to whom was referred the accounts of the commissioners of the canal fund, and the canal commissioners, &c. made a report, which was read as follows, viz:

The Committee on Finance, to whom was referred the Report of the Commissioners of the Canal Fund, and so much of the Report of the Canal Commissioners as relates to their accounts, and the accounts of the Acting Canal Commissioners, respectfully

REPORT.

That they have carefully examined the accounts and vouchers in relation to the receipts and disbursements of the Canal Fund, and the accounts and vouchers in relation to the expenditures on the Ohio and Miami Canals, in the construction thereof, for the year ending the 30th of November, 1827.

The receipts and disbursements of the Canal fund, for the year ending November 30, 1827, are as follows:

RECEIPTS.

Unexpended balance which remained undrawn, on the 30th of November, 1826, consisting of the following items:

Amount deposited in the Manhattan Bank, New York,		\$194,978 40
Amount deposited in the Lancaster Ohio Bank,		4,682 15
Amount deposited in the Western Reserve Bank,		48,060 44
Balance in the hands of Eiban A. Brown,	158 00	
Do do Simon Perkins,	36 88	194 88

Total amount on hand and unexpended, November 30, 1826,	\$247,915 87
Balance of the loan of 1826,	413,634 51
Interest on deposits in the Manhattan Bank, to January 1, 1827,	21,063 29
Appropriations received from the State Treasury,	71,506 43
Premium on the loan of 1827,	77,580 67
Part of the principal of the loan of 1827,	403,500 00
Difference of interest received of W. G. Buckner,	104 59
Amount of tolls received,	827 10

Total amount of receipts,	<u>\$1,236,132 46</u>
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DISBURSEMENTS.

Payments made by the Western Reserve Bank, in the year 1826, and not previously settled and reported,	\$1,000 00
Payment to the Lancaster Ohio Bank, for a temporary loan obtained in 1826, and previously reported,	30,000 00
Payments made to contractors on the two Canals, as per accounts and vouchers rendered:	
By the Lancaster Ohio Bank,	\$457,313 67
By the Western Reserve Bank,	304,202 17
	<u>761,515 84</u>

Payments for contingencies:

By the Lancaster Ohio Bank,	\$19,449 52	
By the Western Reserve Bank,	20,519 50	39,969 02

Personal expenses of the Canal Commissioners, other than the Acting Commissioners,	492 98
Awards for damages,	4,448 77
Interest on loans,	80,090 31
Contingent expenses of the Canal fund,	219 79

Personal expenses of the Commissioners of the Canal Fund, not previously charged,	\$859 15	
Incidental expenses of the Canal Fund,	44 53	903 68
Balance of the fund undrawn and unexpended, November 30, 1827,		317,392 07
		<u>\$1,236,132 46</u>

Of the above balance, undrawn and unexpended, there is deposited:

In the Manhattan Bank, New York,		\$204,014 76
In the Lancaster Ohio Bank,		98,483 65
In the Western Reserve Bank,		14,665 89
the hands of the Fund Commissioners, to wit:		
Ethan A Brown,	\$99 54	
Ebenezer Buckingham,	64 02	
Simon Perkins,	64 21	227 74
		<u>\$317,392 07</u>

The Commissioners of the Canal Fund have exhibited to the Committee the following statement of receipts, and of their accounts for personal and incidental expenses, during the current year:

Balance in the hands of Ethan A. Brown, as per former report,	\$158 00
Draft on the Manhattan Bank for	250 00
	<u>\$408 00</u>

From which deduct his personal expenses at Columbus, in November and December, 1826, and January, 1827; at Cleveland, in June and July; and at New York in September, October and November, 1827; as audited and allowed by the Auditor of State,

\$295 74

Payments for filling up scrip certificates of stock, postage, and stationery, as per vouchers exhibited,

12 72

308 46

Balance in his hands November 30, 1827,

99 54

\$408 00

Cash received by Ebenezer Buckingham in January and October, 1827, at the Manhattan Bank,

550 00

From which deduct amount due him, as per last report,

\$63 46

His personal expenses at Columbus, in December, 1826, and January, 1827; at New York, in February, March and April; at Cleveland, in June and July; and at New York, in September, October and November, in 1827; as audited and allowed by the Auditor of State,

390 93

Payments for postage, blank book and lettering, as per vouchers exhibited,

31 62

422 55

Balance in his hands, November 30, 1827,

64 02

\$550 00

Balance in the hands of Simon Perkins as per last report,

36 88

Cash received at the Manhattan Bank, Oct. 26, 1827,

200 00

\$236 88

From which deduct his personal expenses at Columbus, in December, 1826; at Cleaveland, in July; at New York, October and November; and at Columbus, in December, 1827; as audited and allowed by the Auditor of State,

Letter postage,	172 48	
	19	172 67
Balance remaining in his hands,		64 21
		<u>\$236 88</u>

From the above statement, it appears, that the personal expenses and incidental charges, incurred by the Fund Commissioners, for the year ending November 30, 1827, were as follows:

By Ethan A. Brown,	\$308 46	
By Ebenezer Buckingham,	422 55	
By Simon Perkin,	172 67	903 68
Balance in their hands unaccounted for,		<u>227 77</u>

Amount reported by said Commissioners, as in their hands, for expenses,

\$1,131 45

In stating and presenting the above account of the receipts and disbursements of the Canal Fund, for the year ending the 30th of November, 1827, the Committee have carefully examined and compared the vouchers for each item charged, and the accounts and vouchers of the several Banks by which the funds have been received, and through which the same have passed, or by which the payments have been made, and find that no part thereof has been expended or disbursed, but in strict compliance with the laws of the state, and with every precaution which is necessary to secure accuracy, a rigid accountability, and fidelity, in the public agents employed by the state for this service.

STATEMENT OF THE EXPENDITURES ON THE OHIO AND MIAMI CANALS, FOR THE YEAR ENDING NOVEMBER 30, 1827.

1. On Contracts.

By Alfred Kelley, Acting Commissioner on the Ohio Canal,	\$313,109 27	
By M. T. Williams, Acting Commissioner on the Ohio Canal,	187,114 47	
On the Miami Canal,	258,525 79	\$758,749 53

2. For wages and salary of the Acting Commissioners, Engineers, &c.

By Alfred Kelley,	\$10,424 26	
By M. T. Williams,	11,586 03	22,010 29

3. For subsistence to Engineers, and incidental expenses.

By Alfred Kelley,	\$6,343 30	
By M. T. Williams,	6,037 00	12,380 30

4. For contingent expenses in repairing the Ohio Canal, Lock tending, &c.

By Alfred Kelley,	1,907 72
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5. For awards for damages.

By M. T. Williams, on the Miami Canal,	4,521 87
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6. For lands purchased.

By M. T. Williams,	296 40
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Total amount of expenditures on the Ohio and Miami Canals, for the year ending Nov. 30, 1827,

\$799,866 11

Of the above amount of expenditures, there has been paid in checks drawn by Alfred Kelley, on the Western Reserve Bank, the sum of

		\$316,668 17
In checks drawn on the Lancaster Ohio Bank, by Alfred Kelley,	\$15,116 38	
In checks drawn on the same Bank, by M. T. Williams.	468,081 56	483,197 94

Total amount of expenditures as above,		<u>\$799,866 11</u>
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The payments of expenditures have been made as follows:

By the Western Reserve Bank,	\$324,721 67
By the Lancaster Ohio Bank,	481,211 96

Total amount of payments as reported by the Fund Commissioners,	\$805,933 63
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From which deduct the amount of unredeemed checks, not presented for payment, on the 30th November, 1826,	16,006 75	\$789,926 88
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Balance of unredeemed checks, not presented for payment, on the 30th November, 1827,		9,939 23
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Total amount of expenditures, as above,		<u>\$799,866 11</u>
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The items of these expenditures have been examined by the Committee, and compared with the receipts and vouchers exhibited to support them, and found correct. They are also supported by the abstracts of the accounts of the Banks through which the payments have been made, together with the checks of the Acting Canal Commissioners (so far as those checks had been presented for payment) accompanied by the certificates of the Resident Engineers, that work to the amount of the checks had been performed, in all cases of contracts; and the amount charged for wages and salaries of the Acting Commissioners, Engineers, &c.; for subsistence and incidental expenses; for awards; and for lands purchased; are also supported by the abstracts of payments made by the Banks, by the checks drawn therefor by the Acting Commissioners, as well as by the receipts of those to whom the payments have been made, which were also exhibited and examined by the Committee.

The Committee have also examined the system adopted by the Commissioners of the Canal Fund, and the Canal Commissioners, in keeping and stating their respective accounts, and the manner in which the public funds are received, transmitted, and ultimately disbursed in payments, for the construction of the Canals, and find the same well adapted to the public service; combining simplicity with accuracy; and calculated to insure a faithful application of the same without the hazard of delinquency; and, at the same time, securing to the state every necessary facility in the prosecution of these works.

The moneys borrowed by the Commissioners of the Canal Fund, are first paid and deposited in the Manhattan Bank, New York, subject only to their order; the said Bank acting as the loan agent, and keeping the books of the Canal stock, for the state. These funds are drawn for and remitted, from time to time, as required by the progress of the work, through such of the local Banks of this state, as are made the agents for paying the same to contractors and others engaged in the construction of the Canals; but in no case, without a previous requisition of the Board of Canal Commissioners, for that purpose, and in no instance, to a greater amount than that so required.

The Board of Canal Commissioners, from time to time, as the expenditures of the work render necessary, make requisitions on the Fund Commissioners to deposit in such of the local Banks of the state as are made the paying agents, certain sums, subject only to the special and restricted orders of the Acting Com-

Commissioners, in favor of contractors, for work done under contracts. These orders or checks, to authorize the Banks in making payments thereon, must be accompanied by the certificates of the Engineers who superintend the work, stating therein the names of the contractors and the numbers of the sections, and certifying that work has been done, under such contracts, to the value of a certain sum therein stated and estimated, at the contract price; and all subsequent certificates, for work done under the same contract, must state the whole amount of work done, and the amount in addition to that previously certified. Each order or check, must be entered in a book kept for that purpose, by the Engineer, and by him endorsed "Registered;" and if the sum named in the order exceeds that contained in the certificate, (which will be the case on final settlements with contractors, when balances on former certificates have been retained, to insure a faithful compliance with the contracts) the Engineer must also certify, that the amount of the check is due on the contract therein named. The resident Engineer keeps an account and registry, of all orders and checks by him entered, and endorsed "Registered," as also of all certificates by him given for work done on contracts; and any accidental or intentional error, on the part of the Acting Commissioner, who also keeps a similar account, must be detected, and the consequences thereof prevented, before the order is properly authenticated for payment. By this arrangement, no money applicable to payments on contracts, comes into the hands of the Acting Commissioner, nor can he draw an available order, in favor of any contractor, for a greater sum than that actually due. As, therefore, these payments made to contractors, are necessarily equal to the amount of orders drawn on the fund applicable to the payment of work done on contracts, this part of the account, rendered quarterly by the Acting Commissioner, will always balance itself.

Other sums are, from time to time, deposited by the Fund Commissioners, in the local banks designated for that purpose, on the requisition of the Board of Canal Commissioners, subject only to the orders of the Acting Commissioners, for the payment of wages and subsistence of Engineers and assistants, and other incidental and contingent expenses not belonging to the head of contracts.

Duplicate receipts are taken for all payments, made by the Acting Commissioners to contractors, one of each of which is filed as a voucher for the corresponding abstract of accounts; and the Bank accounts which are rendered to the Fund Commissioners, accompanied by the checks in support of the same, are compared with the quarterly accounts of the Acting Commissioners, for the same payments. Similar receipts are also taken, in their name, for all moneys paid by them, or by the Engineers under them, for wages, subsistence, and incidental expenses, of those employed in the surveys and in the direction of the work. Accounts are rendered quarterly of all these expenses, accompanied by the receipts as vouchers, showing each item of expense, and the aggregate amount thereof under the several appropriate heads. The Acting Commissioners are charged with the sums deposited, from time to time, subject to their unrestricted orders, and credited with the amount of disbursements made as aforesaid. These quarterly abstracts of payments and expenditures, are examined by a Committee of the Canal Board, and compared with the receipts exhibited, and are then recorded at full length, in a book kept by the Clerk of the Board for that purpose. From these abstracts, an account current is made out and rendered quarter yearly, by each Acting Commissioner, exhibiting the amount of payments and disbursements, made by him during the current quarter, under the head of contracts, and the several heads of expenditure, with the total amount of disbursements, and the balance in his hands, or in deposit subject to his order; and the original accounts and vouchers are then deposited in the office of the Auditor of State. From these data general entries are made, and accounts stated, which exhibit the aggregate expenditures on the Canals for each quarter, the amount expended on each Canal, and on each grand division thereof; the amount paid on contracts; the several sums paid for wages and salaries of the Acting Commissioners, Engineers, &c for subsistence, and for incidental and contingent expenses; and the total amount to the close of any given quarter. All these vouchers, receipts, and checks, are subsequently examined, and compared with the several accounts to which they belong, by sepa-

rate Committees appointed by each branch of the General Assembly, and a report thereon made to each House, during the session to which the respective reports of the Canal Commissioners and the Fund Commissioners, are made.

STATEMENT of the receipts and disbursements of the Canal Fund, from the commencement of the construction of the Ohio and Miami Canals, to the 30th of November, 1827, inclusive.

RECEIPTS.

IN 1825.

Appropriation from the State Treasury,	\$40,000 00	
Net proceeds of the five per cent. permanent loan of \$400,000 of 1825,	390,000 00	
Interest on deposits in the Manhattan Bank, to January 1, 1826,	6,608 20	\$436,608 20

IN 1826.

Temporary loan of the Lancaster Ohio Bank,	30,000 00	
Do do Bank of Marietta,	10,000 00	
Part of the six per cent. loan of \$1,000,000, of 1826,	594,840 76	
Appropriation from the revenue of the state, of 1825,	30,000 00	664,840 76

IN 1827.

Balance of the six per cent. permanent loan of 1826,	\$405,159 24	
Premium on the six per cent. permanent loan of 1826,	8,475 27	
Amount of the Canal tax of the year 1825, received from the State Treasury,	26,000 00	
Part of the six per cent. permanent loan of \$1,200,000, of 1827,	403,500 00	
Premium on the six per cent. loan of 1827,	77,580 67	
Interest on deposits in the Manhattan Bank, to January 1, 1827,	21,063 29	
Tolls received and accounted for to November 30, 1827,	827 10	
Difference of interest of W. G. Buckner,	104 59	
Amount loaned to the Canal Fund, by the State, in 1827, to wit:		
Of the U. States Military District School Fund,	\$2,418 00	
Of the Virginia Military District School Fund,	39,196 50	
Proceeds of the sales of the Salt Lands, belonging to the common school fund,	3,891 93	45,506 43
		938,216 59

Total amount of the receipts of the Canal Fund to November 30, 1827, \$2,089,665 55

DISBURSEMENTS.

IN 1825.

Interest on the 5 per cent. permanent loan of \$400,000 of 1825, to January 1, 1826,	\$7,511 45
To the Western Reserve Bank for collecting a draft,	20 00
Personal expenses of the Canal Commissioners, other than the Acting Commissioners, to January 1, 1826,	423 04

Personal expenses of the Fund Commissioners,	591 30		
Payments on contracts to November 30, 1825, by Alfred Kelley,	59,718 00		
By Micajah T. Williams,	53,834 00	113,552 00	
Payments of wages and salary of Acting Commissioners, Engineers, &c. for subsistence and incidental expenses, by Alfred Kelley,	\$2,920 00		
By Micajah T. Williams,	4,800 00	7,720 00	\$129,817 79

IN 1826.

Personal expenses of the Fund Commissioners,	\$288 84		
Incidental expenses paid by the Fund Commissioners,	181 70		
Personal expenses of the Canal Commissioners, other than the Acting Commissioners,	171 80		
Temporary loan repaid to the Bank of Marietta,	\$10,000 00		
Interest on do.	225 00	10,225 00	
Interest on temporary loans to Lewis Cass, and to Ebenezer Buckingham and Company,	156 09		
Payments on contracts to November 30, 1826.			
By Alfred Kelley,	\$341,737 46		
By M. T. Williams,	348,215 01	689,952 47	
Payments made for wages and salary of Acting Commissioners, Engineers, &c. for subsistence and incidental expenses, to Nov. 30, 1826:			
By A. Kelley,	\$10,544 10		
By M. T. Williams,	12,821 63	23,365 73	725,041 63

IN 1827.

Temporary loan repaid to the Lancaster Ohio Bank,	\$30,000 00		
Interest on all loans to July 1, 1827, inclusive,	80,090 31		
Personal expenses of the fund Commissioners,	859 15		
Incidental expenses paid by the Fund Commissioners,	44 53		
Personal expenses of the Canal Commissioners, other than the Acting Commissioners	492 98		
Contingent expenses of the Canal Fund,	319 79		
Awards for damages,	4,448 77		
Payments on contracts to November 30, 1827:			
By the Lancaster Ohio Bank,	\$457,313 67		
By the Western Reserve Bank,	304,202 17	761,515 84	
Payments for contingencies to Nov. 30, 1827:			
By the Lancaster Ohio Bank,	\$19,449 52		
By the Western Reserve Bank,	20,519 50	39,969 02	917,740 39
Total amount of disbursements from the Canal Fund to November 30, 1827,			\$1,772,599 81
Balance of the fund unexpended Nov. 30, 1827,			317,065 14
Total amount of receipts of the Canal Fund to November 30, 1827,			\$2,089,665 55

It will be seen, that the sum designated above, as the unexpended balance of the fund, on the 30th of November, 1827, is 326 dollars and 33 cents less than that

stated by the Fund Commissioners, and the same amount less than that previously stated in this report. In this review and examination of the receipts and disbursements of the entire fund, and in the above statement of the same, it is possible the Committee may have erred in some particular. but if they have, they have not been able to detect the error. Some confusion prevails in the former reports on this subject, which induced the Committee to exhibit a statement of all the items which constitute the fund, and an account of all the disbursements thereof, that a more clear and perfect view may be had of its means and ability to sustain the future expenditures, in the construction of the Canals.

Amount of funds applicable to the construction of the Canals, for the year ending November 30, 1828:

Unexpended balance of the fund, November 30, 1827,	\$317,065 74
Balance of the six per cent. loan of \$1,200,000, of 1827,	796,500 00
	<hr/>
	\$1,113,565 74

From which deduct the amount of unredeemed checks, November 30, 1827,	\$9,939 33	
Amount borrowed of the State, of the school funds,	45,506 43	
Balance of the fund appropriated to pay interest on the Canal debt, on the 1st Jan. 1828,	63,656 27	119,102 08
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And there remains applicable to the construction of the Canals, for the year ending November 30, 1828,

\$994,463 71

The entire Canal debt, on the 1st of January, 1828, of which the interest is payable semi-annually, on the first of July and January, and the whole of which is irredeemable until the year 1850, and redeemable after that period, at the pleasure of the state, amounted to

\$2,600,000

And consists of the following items:

Five per cent. loan of 1825,	\$400,000	
Six per cent. loan of 1826,	1,000,000	
Six per cent. loan of 1827,	1,200,000	\$2,600,000
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STATEMENT of the fund appropriated and applicable to the payment of the interest, and the ultimate redemption of the principal, of the Canal debt, on the 1st of January, 1828, inclusive.

RECEIPTS.

Appropriation from the State Treasury, in 1825,	\$40,000 00
Interest on deposits in the Manhattan Bank, to January 1, 1826,	6,608 20
Appropriation from the revenue of the state, of 1825,	30,070 00
Premium on the six per cent. loan of \$1,000,000 of 1826,	3,475 27
Amount received of the Canal tax, of 1826,	26,000 00
Interest on deposits in the Manhattan Bank, to January 1 1827,	21,063 29
Premium on the six per cent. loan of 1,200,000, of 1827,	77,580 67
Difference of interest of W. G. Buckner,	104 59
Tolls received and accounted for, to November 30, 1827,	327 10
	<hr/>
Total,	\$210,659 12

DISBURSEMENTS.

Amount retained, to pay the premium on the five per cent. loan of 1825,	10,000 00
Interest on the five per cent. loan of 1825, to January 1, 1826,	7,511 45
Interest on a temporary loan of \$10,000 00 of the Bank of Marietta, 1826,	225 00
Interest on temporary loans to Lewis Cass, and E. Buckingham & Co 1826,	156 09
Amount paid Western Reserve Bank for collecting draft,	20 00

Interest on all the loans, to July 1, 1827, inclusive,	80,090 31
Interest on all the loans to January 1, 1828, inclusive,	49,000 00
Balance of the fund applicable to the payment of interest and principal, for the year ending January 1, 1829, inclusive,	63,656 27
	<u>\$210,659 12</u>

ESTIMATE of the fund, applicable to the payment of interest on the Canal debt, and \$10,000 of the principal thereof, as required by the Act entitled "An act to provide for the internal improvement of the state of Ohio, by navigable Canals," for the year ending the 1st day of January, 1829, inclusive.

Balance of the fund on hand, Jan. 1, 1828,	\$63,656 27
Balance of the Canal tax, of 1826, in the State Treasury, not yet paid over to the fund,	48 34
Amount in the State Treasury, received from the sales of town lots in Akron, for Canal purposes,	483 45
Amount of the Canal tax, of 1827, in the State Treasury,	84,016 47
Amount of tolls collected in 1827, not accounted for on the 30th November, 1827, estimated at	950 00
Amount of tolls for the year 1828, estimated at	25,000 00
Interest on deposits in the Manhattan Bank, to January 1, 1828, estimated at	15,000 00
Interest on deposits in the Manhattan bank, to January 1, 1829, inclusive, estimated at	15,000 00

Total amount of the Interest Fund for the year 1828,
This fund will be charged with the following items:

Payment of principal of the Canal debt,	\$10,000
Interest on the permanent loan of 1825	20,000
ditto ditto of 1826	60,000
ditto ditto of 1827	72,000
Interest on a new loan of 1828, estimated at	10,000
	<u>172,000 00</u>

Balance of the fund, after meeting all its liabilities, to January 1, 1829, inclusive

\$32,154 53

From the report of the Auditor of State, it appears there is a surplus fund in the Treasury, not required for the ordinary purposes of government, which, if appropriated to this fund, would increase it

40,000 00

And would leave, applicable to the same objects, for the year 1829,

\$72,154 53

Estimate of the fund, applicable to the payment of Interest on the Canal debt, and \$20,000 of the principal thereof, as required by the act, entitled "An act to provide for the internal improvement of the state of Ohio, by navigable Canals," for the year ending the first day of January, 1830, inclusive,

Balance of the fund, estimated to be on hand January 1, 1829,	\$72,154 53
One and one half mill tax on the aggregate amount of taxable property in the state, for the year 1828,	85,000 00
Amount of tolls for the year 1829, estimated at	75,000 00
Interest on deposits in the Manhattan Bank, during the year 1829, estimated at	12,000 00
Proceeds of donations to the fund, up to the close of the year 1829,	5,000 00

Total amount of the interest fund, for the year 1829,

\$249,154 53

This fund will be chargeable with the following items:

Payment of principal of the Canal debt,	\$20,000
Interest on the permanent loan of 1825,	20,000
ditto ditto of 1826,	60,000

ditto	ditto	of 1827,	72.000	
ditto	ditto	of 1828,	50.000	222,000 00

Balance of the fund applicable to the same objects, for the year 1830, \$27,154 53

Estimate of the fund, applicable to the payment of interest on the Canal debt, and \$30,000 of the principal thereof, as required by the act, entitled 'An act, to provide for the internal improvement of the state of Ohio, by navigable canals,' for the year ending Jan. 1, 1831, inclusive.

Balance of the fund estimated to be on hand Jan. 1, 1830,	\$27,154 53
One and one half mill tax on the aggregate amount of taxable property in the state, for the year 1829,	85.000 00
Amount of the tolls for the year 1830, estimated at	150,000 00
Proceeds of donations to the fund	5.000 00

Total amount of interest fund, for the year 1830 \$267,154 53

This fund will be chargeable with the following items:

Payment of principal of the Canal debt,	\$30,000	
Interest on the permanent loan of 1825	20,000	
ditto ditto of 1826	60,000	
ditto ditto of 1827	72,000	
ditto ditto of 1828	60,000	242,000 00

Balance of the fund applicable to the same objects for 1831, \$25,154 53

In estimating the fund available for the payment of interest on the Canal debt, for the years 1828, 1829, and 1830, and that portion of the principal required by law to be paid, during those periods, it will be seen, that the sum of 40,000 remaining in the State Treasury, at the present time, and not required for any of the ordinary purposes of government, is included. If that sum should be immediately invested in 5 per cent. canal stock, or applied to the payment of interest, it will be increased, as a sinking fund, at the close of the year 1830, to the sum of \$45,600, and no additional taxes will be necessary, for canal purposes, for the years 1828 and 1829, to meet all the requirements of the law.

The estimate of \$25,000 for tolls, on the two canals, for the year 1828, has been predicated upon the fact, that during the present year, 38 miles of the Ohio canal, from Cleaveland to Akron, will be in operation the whole season, and 63 miles from Cleaveland to Massillon, from the first of July next; and 43 miles of the Miami canal, from Cincinnati to Middletown, will be in operation the whole season, and 66 miles, from Cincinnati to Dayton, from the 15th August next; equal to 129 miles of navigable canal open for boats, from the 15th August; 106 miles of the same, from the first of July, and 81 miles, during the whole season. For the year 1829, the tolls have been estimated at \$75,000. During that year, the Miami canal will be open for boats the whole season, throughout its entire extent, 66 miles; and the Ohio canal will be navigable, during the whole season, from Cleaveland to Coshocton, 134 miles, and from Cleaveland to the south end of the Licking summit, 94 miles, from the first of June, equal to 260 miles navigable for boats, from the first of June, and 200 miles of the same during the whole season. One hundred and fifty thousand dollars are the estimated receipts for tolls, for the year 1830, on both canals, predicated on the following data: The entire Miami canal, 66 miles, will be open for boats, the whole season; and of the Ohio canal, 194 miles, from Cleaveland to the south end of the Licking summit, will be navigable during the whole season, and 264 miles of the same, from Cleaveland to Chillicothe, from the first of July of that year; equal to 330 miles of navigable canal open for boats, from the first of July, and 264 of the same during the whole season. After the year 1830, it is confidently believed, that the receipts for tolls on the two canals, together with the present rate of tax, of one and a half mill upon the dollar on the aggregate

amount of taxable property in the state, will meet all the demands for interest on the canal debt, and more rapidly liquidate the principal, than required by law, or by the plighted faith of the state. Should the General Assembly, therefore, appropriate the surplus funds now in the State Treasury, of \$40,000. to the sinking fund, applicable to the payment of interest and the ultimate redemption of the principal, of the canal debt, it is not anticipated, that any increase of taxation beyond that of 1827, for canal purposes, will be required to meet all the engagements of the state, in the construction of the Ohio and Miami canals.

The committee, in making these examinations, and in presenting the above estimates and view of the fiscal concerns of the state, in relation to the construction of the Ohio and Miami canals, have, from mutual convenience, acted in conjunction with the committee of Ways and Means of the Senate, to whom the same matters were referred by that body, and by whom the same report will be made to that branch of the General Assembly. The importance of the subject; the amount of money expended in this service; and the magnitude of the undertaking, in which the state is engaged; seemed to require a rigid investigation of the accounts, an inquiry into the mode adopted to secure a prompt and strict accountability, and a full and fair exhibit of the present state and condition of the funds appropriated for these works. Such an examination and investigation has been had; and the committee have the satisfaction in stating, that it has resulted in an entire confidence in the ability, fidelity, and integrity, of those entrusted with the public funds applicable to this undertaking, and those engaged in the direction, management, and construction of the public works, authorized by the act, entitled "An act to provide for the internal improvement of the state of Ohio, by navigable canals."

AN ACT

To amend the "act for the protection of the Ohio Canals."

Sec. 1. *Be it enacted by the General Assembly of the state of Ohio; That for all damages done to either of the canals, constructing under the authority of this state, the offender or offenders shall be proceeded against by indictment in the proper courts; and on complaint being made to any judge or justice of the peace, of the proper county, against any person or persons doing any such damage as is mentioned in the first, second, third and fourth sections of the act to which this is an amendment, it shall be the duty of such judge or justice forthwith to issue a warrant to the proper officer to arrest, and bring before him, such offender or offenders; and if upon the return of such warrant, it shall appear to the satisfaction of such judge or justice, that such complaint is true, he shall commit such offender or offenders, if he or they shall refuse to give security for their appearance at the next court of common pleas, for the proper county, to answer to said complaint: Provided however, That if the offender or offenders shall pay to such judge or justice of the peace the penalties, forfeitures and expenses which he or they may have incurred, together with the costs of prosecution, such offender or offenders shall be discharged.*

Sec. 2 That the canal commissioners be, and they are hereby authorized and empowered to cut a navigable side cut or branch canal from the main canal, to enter the Muskingum river at or near the town of Dresden, when in their opinion the interest of the state may require such side cut or branch canal; and, also, to construct or permit to be constructed a navigable communication between the Miami canal and the town of Hamilton, in the county of Butler; and if they should deem it inexpedient to construct such communication at the expense of the state, they may permit it to be done at the expense of individuals desiring such communication, under such regulations and restrictions as will secure the interest of the state.

Sec. 3. That the canal commissioners shall, from time to time, make such rules and regulations, not inconsistent with the laws of the state, in respect to size and structure of boats, rafts and other floats, on the waters of the canals; and the weighing and inspecting of boats, and their loading, and in respect to all matters connected with the navigation of the canals; and impose such forfeitures of money, for the breach of such rules and regulations, as they may judge reasonable; and to provide for the detention and sale of any such boats, rafts, and other floats, as shall or may contravene such rules and regulations, in cases where the owier or owners of such boats, rafts, or other floats, shall neglect or refuse to pay such forfeiture: *Provided*, That no forfeiture so imposed, shall for a single offence, exceed the amount of actual damage done thereby more than twenty-five dollars: *And provided also*, That nothing in this section shall be construed to prevent said forfeitures being recovered by action of debt, at the suit of any canal commissioner, or any of the officers or agents employed by said commissioners, who are hereby authorized to sue for and recover the same for the use of the state.

Sec. 4. That the canal commissioners shall cause a sufficient number of all such rules and regulations, including the forfeitures for the breach thereof, to be printed, and shall distribute the same to the superintendents, the collectors of tolls, and lock keepers, to be kept in their respective offices for public inspection.

Sec. 5. That whenever, in the opinion of the board of canal commissioners, any water may be spared from any state canal, or works connected therewith, without injury to the navigation or safety of such canal, the board may order a sale of such surplus water, for a term of years, in their discretion, to the person who shall bid the highest annual rent therefor: *Provided*, The same shall not in anywise interfere with the rights of individuals.

Sec. 6. That the collectors of tolls on the canals shall be, and they are hereby authorized to administer oaths in all cases wherein oaths may be required to be administered in performing the duties required of them in their offices.

Sec. 7. That any acting commissioner, engineer or superintendent, duly appointed, shall have full power and authority, at any time, to cause the water to be drawn off, either wholly or partially, from any level or levels of either of the canals which may be under the charge of such acting commissioner, engineer or superintendent, and to cause the water to remain wholly or partially drawn off during such time as he may deem necessary, for the purpose of repairing or preventing any breach or breaches, or removing any bar or other obstruction to navigation, or for the purpose of making, repairing or improving any work or device, or part of any work or device appertaining to, or connected with any such part of the canals; and for the purpose of so drawing off the water, or causing the same to remain drawn off as aforesaid, to open or to close any lock gate, culvert gate, paddle gate, feeder gate, or waste gate, or to cut or make an opening, gap or aperture in any bank, and to cause the said gates or apertures to remain open or shut, as aforesaid, so long as the same shall, in the opinion of such person, be necessary for any of the aforesaid purposes: *Provided however*, That every engineer or superintendent shall, in the exercise of the authority hereby granted, be subject to the orders and instructions of the acting commissioner, or any engineer of superior grade, having charge of the part of the canal affected, or liable to be affected, by the exercise of said authority.

Sec. 8. That if any person, except a commissioner, engineer or superintendent, shall, under any pretence, or for any purpose whatever, open any gate which shall have been shut, or shut any gate which shall have been opened, as specified in the preceding section, without the express direction of the acting commissioner, engineer or superintendent, who shall at that time have charge of that part of the canal, or shall in any way interfere in

raising or drawing down the water on any level of either of the canals, contrary to the directions or orders of the acting commissioner, engineer, superintendent or lock tender, having charge of any lock or part of the canal liable to be affected by such interference, every person so offending shall, for every such offence, forfeit and pay the sum of twenty-five dollars, and moreover be liable for all damages consequent upon any such opening or shutting of any gate, or interference.

Sec. 9. That the captain or master, and the owner of any boat or other float on either of the canals authorized to be made in this state, and likewise the boat or float itself, shall severally be liable to the payment of any penalty, forfeiture, and likewise to all damages which may accrue in consequence of the violation of any of the provisions of any law of the state or any order of the board of canal commissioners, duly made and published, relating to the canals, the navigation thereof or the collection of tolls thereon, by any person navigating any such boat, or assisting in the navigation or management thereof at the time of such violation; and any such boat or other float may, at the discretion of either acting commissioner or any collector of toll, be prevented from navigating either of said canals until such penalty, forfeiture and damages, and costs accrued in prosecuting therefor, shall be fully paid.

Sec. 10. That all laws, and parts of laws, inconsistent with the provisions of this act, be, and the same are hereby repealed.

EDWARD KING,

Speaker of the House of Representatives.

SAMUEL WHEELER,

Speaker of the Senate.

February 11, 1823:

AN ACT OF CONGRESS

To aid the state of Ohio in extending the Miami canal from Dayton to Lake Erie, and to grant a quantity of land to said state to aid in the construction of the canals authorized by law.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there be, and is hereby granted to the state of Ohio, for the purpose of aiding said state in extending the Miami canal from Dayton to Lake Erie, by the Maumee route, a quantity of land, equal to one half of five sections in width, on each side of said canal, between Dayton and the Maumee river, at the mouth of the Auglaize, so far as the same shall be located through the public land, and reserving each alternate section of the land unsold, to the United States, to be selected by the commissioner of the General Land Office, under the direction of the President of the United States; and which land, so reserved to the United States, shall not be sold for less than two dollars and fifty cents per acre. The said land, hereby granted to the state of Ohio, to be subject to the disposal of the Legislature of said state, for the purpose aforesaid, and no other: *Provided,* That said canal, when completed, shall be, and forever remain, a public highway, for the use of the Government of the United States, free from any toll or other charge, whatever, for any property of the United States, or persons in their service, passing through the same: *And provided also,* That the extension of the said Miami canal shall be commenced within five years, and completed within twenty years, or the state shall be bound to pay to the United States the amount of any lands previously sold; and that the title to purchasers, under the state shall be valid.

Sec. 2. *And be it further enacted,* That so soon as the route of said canal shall be located, and agreed on by said state, it shall be the duty of the Governor thereof, or such other person or persons as may have been, or shall hereafter be, authorized to superintend the construction of said canal, to examine and ascertain the particular lands to which the said state will be entitled un-

der the provisions of this act, and report the same to the Secretary of the Treasury of the United States.

Sec. 3. *And be it further enacted*, That the state of Ohio, under the authority of the Legislature thereof, after the selection shall have been so made, as aforesaid, shall have power to sell and convey the whole, or any part of said land, and give a title, in fee simple, therefor to the purchaser thereof.

Sec. 4. *And be it further enacted*, That the state of Indiana be, and hereby is, authorized to convey and relinquish to the state of Ohio, upon such terms as may be agreed upon by said states, all the right and interest granted to the said state of Indiana to any lands within the limits of the state of Ohio, by an act, entitled "An act to grant a certain quantity of land to the state of Indiana, for the purpose of aiding said state in opening a canal, to connect the waters of Wabash river with those of Lake Erie," approved on the second of March, one thousand eight hundred and twenty-seven; the state of Ohio to hold said land on the same conditions upon which it was granted to the state of Indiana, by the act aforesaid.*

Sec. 5. *And be it further enacted*, That there be, and hereby is granted to the State of Ohio, five hundred thousand acres of the lands owned by the United States, within the said state, to be selected as hereinafter directed; for the purpose of aiding the State of Ohio in the payment of the debt, or the interest thereon, which has heretofore been, or which may hereafter be, contracted by said state, in the construction of the canals within the same, undertaken under the authority of the laws of said state, now in force, or that may hereafter be enacted, for the extension of canals now making; which land, when selected, shall be disposed of by the Legislature of Ohio, for that purpose, and no other: *Provided*, The said canals, when completed or used, shall be, and forever remain, public highways, for the use of the Government of the United States, free from any toll or charge whatever, for any property of the United States, or persons in their service passing along the same: *And provided further*, That the said canals, already commenced, shall be completed in seven years from the approval of this act; otherwise the State of Ohio shall stand bound to pay over to the United States, the amount which any lands, sold by her, within that time, may have brought; but the validity of the titles derived from the state by such sales, shall not be affected by that failure.

Sec. 6. *And be it further enacted*, That the selection of the land granted by the fifth section of this act, may be made under the authority, and by the direction of the Governor of the State of Ohio, of any lands belonging to the United States within said State, which may at the time of selection be subject to entry at private sale, and within two years from the approval of this act: *Provided*, That, in the selection of the lands hereby granted, no lands shall be comprehended which have been reserved for the use of the United States, as alternate sections, in the grants hitherto made, or which may be made during the present session of Congress, of lands within the said state, for roads and canals: *And provided*, That all lands so selected shall, by the Governor of said state, be reported to the office of the Register of the district in which the land lies, and no lands shall be deemed to be selected until such report be made, and the lands so selected shall be granted by the United States to the State of Ohio.

Sec. 7. *And be it further enacted*, That this act shall take effect, provided, the Legislature of Ohio, at the first session thereof, hereafter to commence, shall express the assent of the state to the several provisions and conditions hereof; and unless such expression of assent be made, this act shall be wholly inoperative, except so far as to authorize the Governor of Ohio to proceed in causing selections of said land to be made, previous to the said next session of the Legislature.—Approved—24th May, 1828.

*The conditions are the same as in this act.—Editor.

FOURTH ANNUAL REPORT OF THE FUND COMMISSIONERS.

JANUARY 5, 1829.

To the General Assembly of the State of Ohio:

The Commissioners of the Canal Fund, in pursuance of the duty required of them by law, respectfully REPORT:

That, on the eighth day of October last, they contracted in New York, for a loan to the State of Ohio, of twelve hundred thousand dollars, bearing interest at the rate of six per cent. per annum, payable semi-annually; the principal to be redeemable after the year 1850, at the pleasure of the State. On the certificates of the stock of this loan, the State receives a premium of \$4, 07-100, for every hundred dollars of the debt so certified; or \$48,840 premium for the whole loan. This premium, together with ten per cent. of the loan, were paid at the time of contracting; the remainder was made payable in equal monthly instalments of ten per cent. each, beginning on the first of February next; with liberty to the contractors to pay either or all of the last nine instalments, in anticipation of the time when they shall become due.

The Commissioners submit to the Legislature, the following statement, in relation to the fund they have in charge. In so doing, they can only be expected to arrive at exactness up to the date of the returns from their agents, (some of whom are distant,) and in cases where certain data for calculation are afforded. In those particulars depending upon estimate, they have endeavored to assume grounds as little liable to exception as possible.

Balance, as per last report	\$318,295 75	
Deduct expenses of Commissioners Canal Fund in 1827	903 68	
Balance on hand at date of last report		\$317,392 07
Received for balance of loan of 1827		796,500 00
“ interest from Biddle and others		106 68
“ ditto from Manhattan Company, on deposits, 1827		20,503 29
“ from State Treasurer, balance Canal Revenue, 1826		48 37
“ ditto Canal Revenue, for 1827		85,938 37
“ ditto surplus Revenue, of 1827		40,000 00
Paid into the Treasury by A. Kelley, for lots		483 43
“ Western Reserve Bank, by Beardsley, for tolls		275 59
Loan of the Virginia Military School Fund	46,420 43	
“ United States do do	3,718 28	
“ proceeds sales Salt Reservations	4,892 75	
		55,031 46
Premium received on loan of 1828		48,840 00
First instalment on do		120,000 00
		<hr/>
		\$1,485,119 26

Paid Treasurer School Fund borrowed, 1827 45,506 43

Payments to Contractors on the Canals:

By the Lancaster Ohio Bank	451,576 27	
“ Western Reserve Bank	274,722 93	
	<hr/>	726,299 21

Payments for contingent expenses:

By the Lancaster Ohio Bank	17,483 07	
“ Western Reserve Bank	19,986 72	
	<hr/>	37,469 79

Payments of awards for damages :

By the Lancaster Ohio Bank	6,279 55	
“ Western Reserve Bank	2,127 00	
	<hr/>	8,406 55
Expenses of the Canal Commissioners		691 15
Paid S. Sturges, clerk hire, 1827		100 00
“ Interest		54,237 40

Expenses Commissioners Canal Fund :

Ethan A. Brown	450 79	
Simon Perkins	133 64	
E. Buckingham,	\$206 99	
“ incidental expense,		
(clerk hire,) 1828	100 00	
	<hr/>	306 99
		891 42
		<hr/>
		873,601 95
		<hr/>
		\$611,517 31

Of this remaining balance, there is

Deposited in the Manhattan Bank	564,188 05
“ Lancaster Ohio Bank	13,215 29
“ Western Reserve Bank	33,677 62

In the hands of the Commissioners Canal Fund :

Ethan A. Brown	48 75	
Ebenezer Buckingham	257 03	
Simon Perkins	130 57	
	<hr/>	436 35
		<hr/>
		\$611,517 31

The Commissioners estimate the Funds available,
towards finishing the Canals, as follows:

Balance of the Fund as above	611,517 31
do of the loan of 1828	1,080,000 00
Estimated Canal Revenue of 1828	150,000 00
	<hr/>
	\$1,841,517 31

From which deduct,

Estimated interest paid stockholders July 1, 1828	70,000 00
do do 1st January. 1829	80,000 00
do to be paid do 1st July, 1829	106,000 00
do do 1st January, 1830	112,000 00
do amount to be paid Fund borrowed from Treasury	58,000 00
	<hr/>
	426,000 00

Leaving for completion of the Canals, the sum of \$1,415,517 31

The General Assembly will please to observe, that as the official report of the payment of the last instalments of the loan of 1827, is not yet arrived; and as the contractors for the loan of 1828, may pay in advance of the periods, when the instalments fall due, the exact amount of interest is, at this time, necessarily uncertain.

Respectfully submitted,

ETHAN A. BROWN,
E. BUCKINGHAM,
SIMON PERKINS.

January 5, 1829.

SEVENTH ANNUAL REPORT OF THE BOARD OF CANAL COMMISSIONERS.

COLUMBUS, JANUARY 6, 1829.

**THE Board of Canal Commissioners respectfully REPORT:
IN RELATION TO THE OHIO CANAL.**

During the past season, the unfinished works on that part of the Ohio Canal, which has been under contract, have been advancing toward a state of completion. Although the amount of labor performed, has fallen considerably short of the previous anticipations of the Board, no serious obstacles, except those of a temporary character, have presented themselves. Causes entirely beyond our control, which could not have been foreseen, and the effect of which no precaution could avert, have combined to delay the completion of some divisions of the Canal, to a later period than was expected.— Nothing, however, calculated in the least degree, to impair the firm confidence heretofore expressed in the entire practicability of the work, its permanency and ultimate utility, has occurred within the past year.

At the time of presenting our last annual report to the General Assembly, it was expected that a division of the Canal extending from Akron to Massillon, 28 miles, would have been finished as early as the middle of May last, and in the month of July following, an additional division of about the same length, extending from Massillon to Dover, in Tuscarawas county. The first of these divisions was opened for navigation about the last of August, and the other, though in an advanced state, is not yet completed.

During the fall of 1827, and the succeeding winter and spring, a greater quantity of rain is supposed to have fallen, than has ever been previously witnessed in this country within the same length of time. The effect is easily imagined. In every situation exposed to inundation from the floods of neighboring streams, or naturally wet and marshy, the work was either wholly suspended or prosecuted under great disadvantages. On the section extending through the swamps from the Summit Lake to the Tuscarawas, the effect of this extraordinary season was peculiarly embarrassing, and greatly retarded the progress of the work, notwithstanding the vigorous and persevering exertions of the contractor to overcome the obstacles which were presented.

The high water produced by frequent rains, rendered it extremely difficult, and in some instances impossible, by the use of any ordinary means, to prepare and fix the foundation of aqueducts, culverts and locks, during the continuance of the wet season. The work connected with these structures, was necessarily subjected to a corresponding delay. Indeed, the difficulties and embarrassments consequent upon the season, extended themselves in a greater or less degree, to almost every kind of work on the Canal, in every situation.

The effects of the extensive plans of internal improvement adopted and prosecuted with extraordinary exertions, by the State of Pennsylvania, have been sensibly felt on all that part of the Ohio Canal which extends from Dresden to the Portage Summit. The demand for labor, and the high wages which it is understood have been paid on the Canals of that State, have produced great competition, occasioned a scarcity of labor, and considerably enhanced its price on that division of the Ohio Canal.

Under these circumstances, it became necessary either to authorize such an advance in the price of labor, as would have secured an adequate supply, and to prosecute the difficult jobs under the great disadvantages occasioned by rainy weather and high water, thereby materially enhancing the cost of the work, or to submit to an extension of the time for its completion. The adoption of the latter alternative, was deemed least injurious to the public interests.

The principal evils resulting from delaying the completion of that division of the Canal which extends from Massillon to Newark, are a short postponement of the benefits expected to be derived from the navigation, and a diminution in the amount of revenue arising from that navigation, during a portion of the past and ensuing seasons. These disadvantages are of a temporary nature, while a great enhancement in the cost of the Canal, would be an evil of a much more permanent character.

Owing to the causes which we have stated, the progress of the work was less rapid than could have been desired, until late in the month of October.— Since that time, the weather has generally been favorable; laborers have been abundant, and the work on that part of the Canal line, which extends from Massillon to the north end of the Licking Summit, has advanced rapidly toward a state of completion. Contractors are still prosecuting their jobs with great energy and effect.

The aqueduct over the Tuscarawas river near the south line of Stark county, has been completed. It is in every respect a very substantial and complete structure, and does great credit to the skill and fidelity of the contractor by whom it was erected. The masonry of which the abutments and piers are composed, is believed to be equal in strength and beauty, to any work of the kind in the United States.

The fine weather and low water of the past fall, have been improved for placing and securing the foundations of aqueducts, culverts and other important structures, which required a low stage of water for their accomplishment, and which had not been previously secured. All these foundations between the Licking Summit and Massillon, have been placed and secured, and the mason work resting upon them, is in all instances so far advanced as to insure its early completion in the ensuing spring.

The aqueducts over the North and Raccoon Forks of Licking, near the town of Newark, and that over the Tomaka creek, are finished with the exception of planking the trunks; the dam at the foot of the Licking Narrows, is also finished.

The walls of all the locks between the Licking Summit and Caldersburgh, and also between Massillon and Dover, 27 in number, are finished with the exception of two locks between the places last named, on which a small amount of work remains to be done. All the culverts on the same divisions, except one of the smallest class, are also completed. The locks between Dover and Caldersburgh, are either finished or so advanced as to secure their completion at an early period in the spring.

Most of the other heavy jobs on the unfinished line north of the Licking Summit, are in a forward state; many of the sections are finished; and should the ensuing winter and spring, prove tolerably favorable, it is confidently expected that a large portion of this division of the Canal, will be prepared to receive the water as early as the middle of May, and all of it by the first day of July next.

Should these anticipations be realized, the benefits of Canal navigation will begin to be sensibly felt in the heart of the State, and the revenue derived from tolls will aid materially in the payment of interest accruing on the debt created for the prosecution of the work.

Considerable difficulties have been encountered in excavating the pit for the lower sloop lock, which is to connect the Canal with the harbor at Cleveland. The unusual height of the water in Lake Erie, which, during the past summer, has been three feet above its lowest stage, contributed to increase the difficulty. In order to obtain eight feet depth of water on the mitre sill of the lock, when the Lake shall be at its lowest stage, it was necessary to sink the pit near fourteen feet lower than the surface of the water in the river,

corresponding with that of the Lake. The porous nature of the soil, admitting the water to pass freely through, rendered it extremely difficult, if not impossible, to exhaust the water entirely from the pit. Under these circumstances, the plan of excavating four or five feet in depth of the earth at the bottom of the pit, while the water was standing on it six feet above the bottom, was adopted, and has proved effectual. The excavation of the pit is now nearly or quite finished, and it is confidently expected, that the lock will be completed early the ensuing season. Most of the stone and other materials for its construction, are prepared and delivered.

By means of a short temporary channel between the lower basin and the river, cut at an expense of about fifty dollars, boats have been enabled to pass from the river through the upper sloop-lock, which is finished, into the Canal above. During the greater part of the summer, the Lake has been so high as to enable loaded boats to pass into this lock; which has served to overcome the whole difference between the elevation of the water in the Lake and of that in the Canal above the lock.

The works at the mouth of the Cuyahoga, designed to secure a commodious channel from the Lake into the river, have been prosecuted during the last season, in a very satisfactory manner, by means of the appropriation made by Congress, for that purpose. A pier of 600 feet in length, extending from the shore into the Lake on the east side of the channel, parallel with that previously erected on the west side, is now nearly completed. Both of these piers are built in a very substantial and permanent manner, and have demonstrated the fact, that a channel thus secured, is not liable to be filled with drifting sand, even by the most violent storms, but will remain at the same depth to which the floods of the river shall have opened it. Although no considerable flood has occurred in the river since the erection of the pier on the eastern side, to sweep out the channel to the depth anticipated from a strong flood, yet steam boats and the larger class of schooners with full loads, entered the harbor without difficulty, until the falling of the Lake diminished the depth of water in the channel. The decrease in the depth of the channel, is owing entirely to the subsiding of the Lake; the bottom remaining the same notwithstanding the violence of the storms which have occurred. It is expected that these piers will be extended still further into the Lake, agreeably to the original plan of the work.

The damages occasioned by the great flood of January last, were principally sustained by that part of the Canal which extends from the Portage Summit, north along the valley of the Cuyahoga. This river in many places, rose from one to two feet higher than had ever been previously witnessed by the oldest inhabitants residing near its banks. Such an extraordinary rise of water was not indicated by any water marks which were discoverable at the time of locating the Canal, nor by the recollections of the first settlers in the country; and was not fully provided against by the erection of guard banks, of the requisite height.

Very little damage was sustained from the flood, except in places where the water rose above the top of the banks, and even in these cases, the injury was less at the points where the water flowed into the Canal, than at those where it passed out. Between these points, little or no damage was occasioned by the flowing of the water along the Canal. In several instances, this operation was evidently beneficial, by sweeping from the bottom of the Canal, the deposit of earth, which had washed down from the newly formed banks.

An expenditure not exceeding six thousand dollars, was required to repair these damages, and put the Canal in the same situation in which it was previous to the occurrence of the flood—an amount of damage far less than public rumor had represented, and less it is believed, than was sustained in

several instances, from the same flood, by private property, of much less aggregate value, situated within a more limited space. It is worthy of remark, that whilst the news of the damages was, in one case, circulated with great activity, and received in some instances, with much apparent avidity, in the other case, the disasters were hardly known beyond the immediate district in which they occurred.

Effectual measures have been adopted and executed, for the prevention of similar injuries in future. Guard banks have been raised from one to two feet above the highest rise of the last winter's flood, wherever they were necessary. Extensive waste ways have also been formed by reducing the height of the towing path bank, at places where the natural surface of the earth is nearly on the same level with top water line in the Canal, where the waters of the river do not rise above the level, and where the situation and quality of the earth is such as not to be washed away by the water's flowing over it. Any quantity of water which may be thrown into the Canal by floods or other accidental occurrence, and which can possibly pass forward between the banks, may escape at these places without injury to the Canal. At those places, on the contrary, where a breach would be attended with great damage, on account of the height of the artificial embankment above the natural surface of the earth, the banks have been raised to such a height above top water line in the Canal, as will, in any event, secure them from being overflowed. This method of securing the banks from injury, in consequence of high water within the Canal, is attended with small comparative expense, whilst it is believed to be more effectual than any plan heretofore adopted.

It was found from the experience of the previous season, that the locks were liable to be injured by the careless or unskilful navigation and management of boats. The same evil has been experienced on the Canals of New York.—To prevent this injury, rows of strong piles have been driven both at the head and foot of the locks on each side, which serve to regulate the course of the boat before it enters the lock, and prevent its coming in violent contact with the walls. These piles have been driven at small expense, by means of a machine fixed upon a flat boat, calculated for navigating the Canal. Most of the locks north of the Portage Summit, have already been secured in this manner. Several other improvements, not contemplated by the original plan of the work, have been adopted, in order to secure the locks from injury, and facilitate the passage of boats. These improvements, together with the regulating weirs for passing water round the locks, from one level to another, have enabled us to dispense with regular lock tenders, and consequently to avoid a heavy item of expense, where the locks are so numerous as they are on that part of the Canal.

We have the satisfaction of being able to state, that all the locks, aqueducts, culverts and other important structures on the Ohio Canal, so far as they have been tested, prove to have been founded and built in a very permanent and substantial manner, and to answer fully the purposes for which they were designed. No instance has occurred in which any of these important works have been undermined, or otherwise seriously injured by floods. The locks and culverts, particularly those which have been more recently erected, are believed to be as substantial and durable, as any works of the kind in the United States.

The supply of water on the Portage Summit, is found to be very ample.—A feeder of about ten rods in length, conducts the waters of the Tuscarawas, into the Summit Level. So copious was the stream in the month of August last, that near seven miles in length of the Canal, were filled to the depth of three feet in six hours, from the time of its first introduction. The stream which constantly flowed north from the Summit Level, after receiving the wa-

ters of the Tuscarawas, throughout the remainder of the season, was so ample, aided by the Little Cuyahoga, as to render it entirely unnecessary to resort to the Main Cuyahoga, for an additional supply, until the Canal advances within 16 miles of the Lake.

No doubt is entertained that the supply of water on the Portage Summit, will be found more than equal to the demands of the most active commerce.

A small part of the section, extending from the Summit Lake through the swamp to the Tuscarawas, was not entirely finished at the time of introducing the water, on account of the apprehension of sickness, generally entertained by the laborers who had been previously employed on the job. This circumstance prevented boats from passing the Summit with full loads. No serious difficulty is apprehended in the removal of the earth remaining to be excavated, amounting to about six thousand cubic yards, composed mostly of sand, which it is proposed to do previous to the opening of navigation in the spring.

The Canal north of the Portage Summit, with the exception of about one mile and a half, extending from the Summit to lock No. 15, was prepared for navigation early in April. On this part of the Canal, a change in the arrangement of some of the embankments connected with the locks, was found necessary, in order to give security to the work, which occasioned some further delay of the navigation on this short section. These banks, which were previously much exposed to injury from accidental floods, on account of the rapid descent of the Canal, and the contracted limits of the valley in which it was located, are now so arranged and secured as to give to the works connected with the Canal, all the safety of which they are readily susceptible.

Since the commencement of navigation in the spring, but one breach worthy of notice, has occurred on the Canal north of the Portage Summit; and, with the exception of the time required to repair this breach, about one week, the Canal has generally been in excellent order, and the navigation almost entirely uninterrupted throughout the season.

The division of the Canal extending south from the Summit, has proved, since the introduction of the water, much more secure than that north of the Summit. This difference was anticipated from the formation of the ground which it occupies, the materials of which the banks are composed, and the gentle current of the river along the valley of which it is conducted.

The amount of tolls collected on the northern division of the Ohio Canal during the past season, so far as ascertained, is \$3,916 24. Tolls have also accrued on the transportation of a large quantity of stone, which have not yet been received; making the total amount of tolls which have accrued during the past season, upwards of four thousand dollars.

In consequence of the delay in opening for navigation, those additional sections of the Canal, which it was expected would have been in use during a considerable portion of the past season, the amount of tolls received, has fallen short of the sum anticipated. The unusually light crop of wheat, which forms the great staple of exportation from that section of country bordering on the Canal, also contributed to produce this effect.

For the greater portion of tolls collected during the past year, has accrued on thirty eight miles of the Canal, extending from Akron to Cleveland, and which was navigated during the greater part of the previous season. When this amount is compared with that collected during the preceding season, it will show a very considerable increase, after making due allowance for the difference in the length of time which the Canal was in use each year.

The extent of line which has been navigable during most of the past season, has been too small to offer great inducements for any considerable extent of country, to use it as a channel of commerce: consequently, a comparatively

small amount of property has found its way to the banks of the Canal, for transportation. Even that amount has paid but little toll, on account of the short distance which it has passed; much of it having been conveyed only 20 to 30 miles on the Canal. If only this limited amount of property could have passed throughout the whole length of the Canal, the amount of tolls accruing upon it, would have exceeded \$30,000; while the amount of property transported, in consequence of opening the whole line, would have been increased in a far greater ratio.

Mineral coal has formed a considerable item of transportation on the Canal, though the low rate of toll charged upon this article, has added little to the revenue. Coal, after having been conveyed three miles over land, to the bank of the Canal, and having passed on the Canal about 35 miles to Cleaveland, has been transported thence in schooners, to the Island of Mackina.—Several boat loads destined for Buffalo, in the State of N. York, have also been conveyed from the coal beds, in Stark county, through the northern section of the Canal. The transportation of this article, promises to form, at no distant day, a very important and profitable item of commercial business.

A large amount of wool and cloths, have been conveyed over land, from Steubenville to Massillon, thence on the Ohio Canal, to Cleaveland, across the Lake, through the grand Canal of New York, and by way of the Hudson river and Atlantic Ocean, to the cities of New York and Boston. It is understood that the owners, Messrs Wells & Dickinson, made a considerable saving on the cost of transportation, by adopting this rout in preference to that of sending by wagons, directly to Baltimore or Philadelphia. Even the Oaks which have formed part of the ancient forests of the country, 30 miles from the south shore of Lake Erie, have found their way in the shape of pipe staves, to the city of New York. These facts demonstrate the great advantages of Canal navigation.

The treasures which have been concealed in our hills, the forests which for ages have clothed their summits, and which, but for the Canal, would have remained comparatively useless, for centuries to come, will now be made subservient to an active commerce, and sources of wealth to the interior of our State.

The sum of \$794 28, has been received during the past year, and paid into the Treasury, on account of lots sold in the village of Akron. A partition between the State and the other proprietors of the village plat of Massillon, has not yet been effected, and no part of the money received on account of sales of lots in that town, by the original proprietors, has been paid over to the agents of the State. It is expected that this business will be arranged during the present year.

Under the authority of the act of the 11th of February last, a Side cut, to connect the Canal with the Muskingum river, near the town of Dresden, has been located and put under contract, to be completed by the first day of September next. It is about two and a half miles in length, crosses the Tomika creek, upon an aqueduct, and descends to the Muskingum, by means of three locks, with 28,79 feet of lockage. The cost of its construction is estimated at \$35,400.

Donations have been made to the Canal Fund, in aid of the construction of this work, by the proprietors of the town of Dresden and the citizens interested, viz: Cash obligations and acceptances, to the amount of about \$6000, payable on the first of September next, and on the full completion of the Side cut, the payment of most of which is believed to be secure. Ten acres of ground at the locks, on the margin of the river, so situated, as to control the use of the surplus water, which will be discharged from the Canal at this point, a deed to the State for which, is received and placed on record; twen-

ty five village lots in an addition to the town of Dresden, bordering on the Canal, and adjoining to the present town, a deed for which will shortly be executed; and three hundred dollars in land, at or near the intersection of the Side cut with the Canal, a title to which, it is also expected, will soon be perfected.

The facility with which the trade and business of the towns of Zanesville and Putnam, may be brought into the Canal, through this channel, seems to invite the attention of the State, to the consideration of the subject, and of the means and expense of effecting it. By raising of the dam at Zanesville a little higher than it now is, and constructing a single dam and lock at the proper point above, a slack water navigation of fifteen miles, extending the interests and influence of the Canal that distance down the valley of the Muskingum, may be made for a sum far less than that which would be required to construct a Canal of the same extent.

The importance of this improvement to the revenues of the Canal, to the general interests of the State, and to the particular interests of the valleys of the Licking and Scioto, requires no illustration. The Salt, Iron and Coal of the Muskingum valley, will, by this means, find a cheap and easy access into the populous counties west of that valley, to which they are articles of prime necessity, and in addition to the mutual benefits conferred on the two great valleys of the Scioto and the Muskingum, would unquestionably increase the revenues of the Canal, to an amount exceeding the cost of constructing this dam and lock.

In accordance with the views of the Board, in relation to the division of the Canal south of the Licking Summit, as expressed in the report on that subject, of the 17th of January last, an aqueduct for the crossing of the Scioto river near Circleville, a dam for a feeder, and about thirteen miles of Canal line, in connection with these works, and extending to, and including the crossing of Deer creek, was put under contract on the 30th of May; and on the 14th of Nov., the remaining line between the Summit and Circleville was also placed under contract: the whole to be completed by the 1st of June, 1830.

The line now under contract, south of the Licking Summit, amounts to fifty five miles and 61 chains, embracing 240-75 feet of lockage, divided into 34 locks.

Towards the difference in cost, between the line as now located at Circleville, and that of a line crossing the river at Keffer's point, the sum of three thousand seven hundred dollars, was subscribed; to be paid into the Canal Fund, by the citizens of that place, the most of which, it is believed, will be received.

The total amount of payments made to contractors on the Ohio Canal, for the year ending on the thirteenth day of November last, is \$597,157 55.

Of this amount, there has been paid on the division which extends from Lake Erie to Caldersburgh, \$337,705 27.

On the division extending from Caldersburgh to the south end of the Licking Summit Level, \$242,596 78.

And on the division extending from the south end of the Licking Summit Level, to Deer creek, \$16,855.

The sum of \$2,252 00, has been paid on the Ohio Canal, north of Portage Summit, and the sum of \$1,223 00 on the Canal and Reservoir, at the Licking Summit, for damages awarded to individuals, on account of materials taken for the construction of the Canal, and of land occupied, divided or flowed by the Canal; schedules of which awards, accompanied the last annual report of the Board.

The following table exhibits, at one view, the total value of work performed by contractors, the total amount of money paid on contracts, the total

length of line under contract or finished, and the total amount paid on account of damages awarded for land occupied, materials taken, &c., for the use of the Ohio Canal, and on the several grand divisions thereof, from the commencement of the work, to the first day of December, 1828.

DIVISIONS.	Chains. Miles.	Value of work per- formed.	Amount of money paid on contracts.	Amount of money paid for damages.
From Cleaveland to Massillon -	67 00	782,204 47	732,204 47	2,252 00
" Massillon to Cal- dersburgh -	68 39	353,974 03	329,913 68	
" Caldersburgh to Deer creek	114 69	567,286 75	554,150 93	1,220 00
Totals - -	250 28	1,653,465 25	1,616,269 08	3,475 00

To the sum paid on contracts should be added, \$5,316 81, paid out of the contingent fund, on account of construction north of Massillon; making the whole sum paid for construction, \$1,621,585 89.

It will be seen from the foregoing statement, that the cost of that division of the Canal, which has been opened for navigation, sixty seven miles in length, extending from Cleaveland to, and including the lock one mile south of Massillon, is \$737,521 28; being an average cost of \$11,007 77, per mile. This sum includes the amount paid on account of the original construction, and also, the cost of subsequent repairs, and the extensive improvements which have been made. This division of the Canal, comprehends 49 locks, composed entirely of stone masonry, overcoming an ascent and descent of 436 feet, giving an average of six and a half feet, per mile, which is nearly double the average amount of lockage throughout the whole Canal.

Setting aside the excess of lockage, the cost of this division is believed to be greater in proportion to its length, than that of the whole Canal, comprehending as it does, more than an average of the difficult and expensive points.—A small additional expenditure, probably not exceeding six or seven thousand dollars, will be necessary to finish the sloop lock at Cleaveland, the remaining excavation at the Summit, and to finish the protecting and securing of the banks.

Since the date of our last report to the General Assembly, the Board have determined on the location of the southern division of the Canal, between Big Bottom, above Piketon, and the Ohio river.

Further surveys and examinations were made, preliminary to the final decision of the question, between the two contending routs. Several points were examined, in order to determine on the most eligible for recrossing the Scioto river, by means of an aqueduct. After fixing on the place believed to be the most favorable for that purpose, an estimate was made of the cost to be encountered in the necessary works to accomplish that object. The plan of crossing the river by means of a dam, was believed to be attended with so much liability to interruption and hazard to the navigation, that it was thought inexpedient to adopt it under any circumstances.

The lines located on each side of the river, as well as the several places proposed for the southern termination of the Canal, were re-examined by a committee of the Board, accompanied by the Principal Engineer. Comparative estimates were also made, in order to determine the difference in the cost of the two proposed routs.

Some difference of opinion, in relation to the routs and proposed points of termination, was found to exist among the members of the committee appointed by the Board, to examine and determine this subject. This circumstance, as well as a consideration of the importance of the decision, in its effects on the interests of the State, and of the individuals concerned, induced the postponement of a final determination; and the reference of the whole subject to a full meeting of the Board.

At this meeting, which was convened for the purpose, at Chillicothe, on the 10th day of July, after a full investigation of the subject, in all its bearings, it was decided that the Canal be continued on the west side of the river, to a point immediately opposite the narrow isthmus, between the Scioto and the Ohio, at the lower end of the town of Portsmouth; and that a cut be made through the isthmus, so as to form a direct communication between the termination of the Canal and the Ohio river.

In making this decision, the interests of the town of Piketon, and of the country on the east side of the Scioto, were not disregarded nor forgotten.— On the contrary, a strong disposition was felt, to reconcile these particular interests with those of the State at large, by fixing upon such a plan as would save the one, while it would not injure the other. Every plan offering the least probability of effecting this object, was accordingly examined. It was, however, the deliberate opinion of the Board, that no plan could be adopted, for conducting the Canal to the east side of the river, at or above Piketon, except at an increased expense and risk, altogether incompatible with the public interest, and unwarranted by any advantage resulting from the measure. The difference between the two routs in the cost of constructing a Canal, is believed to be at least \$100,000; but a small proportion of which, in the opinion of the Board, would be reimbursed, from the donations offered, on condition of the eastern line's being adopted.

The hazard of crossing a river as large as the Scioto, after its floods have been augmented by the waters of all its principal tributaries, forms a strong objection to the adoption of the line on the east side of the river, which should require powerful motives to overcome. An aqueduct across the river, at the most favorable point, where a foundation entirely artificial, must be relied on, will inevitably be subject to receive greater or less injury from floods, drift wood and ice; and where a wooden trunk must necessarily be resorted to, as the only plan that the comparative elevation of the river and Canal will admit, frequent repairs involving considerable expense, are the unavoidable consequence.

A Canal on the eastern side of the Scioto, between Piketon and Portsmouth, must occupy a greater extent of rough sideling ground, than one on the western side; and consequently involves a greater expenditure in its original construction, as well as greater liability to breaches and expensive repairs.

While these difficulties have been avoided, by adopting the line on the western side of the river, it is believed that no important interest has been sacrificed by that decision, except that of accommodating the Canal to the fixed capital of the town of Piketon, and a district of fertile country on the east side of the river, somewhat more extensive than that on the western side. These interests, though entitled to their due weight in the scale of deliberation, cannot, in the opinion of the Board, outweigh the important considerations of economy and security, to which we have adverted.

On the plan adopted by the Board, the Canal will intersect the Ohio at a point presenting as deep water and as secure a shelter for steam boats, as any other on the river. It is believed that a convenient channel to admit the passage of steam boats from the Ohio into the Scioto river, at the point of terminating the Canal, may easily be formed and secured. In this harbor, steam and Canal boats may meet and exchange their cargoes with perfect ease and safety, during much the greatest part of the year. As the floods of the Scioto, are of short duration, and those of the Ohio, subside much more slowly, there is generally little current in the Scioto near its mouth; the back water from the Ohio, filling its channel and destroying its current, at all times when the Scioto is low and the Ohio, comparatively high. On this account, the channel of the Scioto presents a harbor much more safe for the meeting of steam boats and Canal boats, than can be found in the strong current of the Ohio.

IN RELATION TO THE MIAMI CANAL.

The injury which this Canal sustained in consequence of the floods of the last winter, was not so great, as, from its exposed situation, was expected.—The cost of repairing the several breaches which occurred on that part of the line below the Miami feeder, did not exceed the sum of two thousand dollars. The effects of the winter on the line, in the lower part of the valley of Mill creek, were of a nature calculated to cause serious difficulty, and to require a very considerable expenditure, to prepare that portion of the Canal for navigation. The settling of the heavy embankments, and the sliding of the earth lying in its natural position, from under the banks of the Canal on the lower side, and into it from the upper side, were evils of much magnitude, which were increased by the peculiarly wet winter and spring.

The breaches caused by the floods, were repaired, and the effects of the winter upon the lower part of the line, so far overcome, as to admit of the passage of boats throughout the line, from Middletown, to Cincinnati, on the 17th of March. Navigation on this division of the Canal, has been continued throughout the season, with frequent interruptions arising out of the peculiar character of the lower part of the line, and the unpropitious nature of the forepart of the season, for the safety of a new Canal, constructed upon clay side hills and artificial banks.

A very salutary change has been produced in the appearance and character of this line, since the termination of the spring rains; the base of the embankments generally has been extended with a view to their greater security; the inner slopes and bottom of the Canal, where it was deemed necessary, have been puddled, and the banks have now become much more solid and compact; and the evils arising from the slips are evidently lessening so far as to give assurances of less difficulty hereafter. But it will require time, with the exercise of much vigilance, to render this part of the Canal entirely free from the evils incident to its peculiar character.

The measures which had been taken at the date of the last annual report of the Board, to secure the dam across the Miami river from further injury, proved effectual. It sustained little or no further damage through the winter and spring; and on the arrival of the proper season, the breach, through which the river had flowed for more than six months, was closed in a very substantial manner. The sum expended in securing and rebuilding the dam, added to that which had been previously paid to the contractor, still keeps the cost of the dam and feeder, within the sum which would have been payable, had it been completed under the contract, without the occurrence of the breach.

The causes, in part, which delayed the progress of the work on the Ohio Canal, have operated in their full force to retard the progress of the work on

the upper division of the Miami Canal. It was confidently believed that this line could be completed in all the month of July; its full completion was, however, delayed until the month of November, notwithstanding every reasonable exertion was made by the contractors to finish their work at an earlier period. The transportation of stone for the locks and aqueducts, the quarries for which were situated several miles from the line, was necessarily delayed until the middle and latter part of the summer, in consequence of the impassable condition of the roads during the winter and early part of the season. This unavoidably delayed the completion of these works until late in the season.

The entire Canal from Cincinnati to Dayton, with a feeder from the Miami river a short distance above Middletown, and one from Mad river, near Dayton, is now completed, with the exception of the dam over Mad river, which was injured by the floods of January last. The water of this river continued so high up to the month of July, as to induce the postponement of the rebuilding of the dam, until another season. The feeder has been extended a short distance further up the stream, which, with the aid of a temporary brush and stone dam, gives an ample supply of water for the present.

The filling of the new line with water, has proved to be a tedious operation. That part of it nearest to Dayton, being first finished, the water was introduced into it as early as the 27th of September; and with an intermission of ten days made necessary by the unfinished state of a job, and another of twelve days, in consequence of a breach in an embankment, there has been a continued flow from Mad river, in the Canal, of from 6 to 10,000 cubic feet of water per minute, up to the present time. Such has been the absorption of the water by the gravelly plains through which the Canal is constructed, that with the utmost exertions on the part of the Superintendent, the water of Mad river has but just reached the head of the lower division of the Canal. This portion of the line being filled with water, a change in the temperature of the weather is all that is now required to open navigation from Cincinnati to Dayton.

With the exception of about seven miles of the line, near Cincinnati, this Canal is believed to be a very safe and permanent work, which will require for its annual repairs, an expenditure comparatively small. It embraces twenty-two locks, overcoming 188 feet of lockage. These are built in a permanent manner, most of them in a character of workmanship, that will bear a comparison with other works of the kind in the United States. The aqueducts on the lower division, are constructed with wooden trunks; those in the upper division, with one exception, upon stone arches with embankments of earth over the arches. That over Clear creek, supported by three arches of forty feet chord, is built in a style of workmanship, which for strength and beauty, is not surpassed by any work of the kind. It reflects much credit upon the skill and fidelity of the contractor.

A Side cut to connect the Canal with the town of Hamilton, has been laid out and constructed under the authority of the Board, within the past season, the length of which is 53 chains and 62 links. The cost of this cut is between six and seven thousand dollars, two thousand dollars of which has been paid by the State, and the remaining sum by the citizens of Hamilton and Rossville.

LENGTH OF THE MIAMI CANAL.

The length of the Miami Canal, as now constructed, from an accurate survey of it, made since its completion, is

<i>Miles.</i>	<i>Chains.</i>	<i>Links.</i>
65	20	34

	<i>Ms.</i>	<i>Ch.</i>	<i>Links.</i>			
Length of Hamilton Side cut	"	53	62			
" Miami feeder	"	42	"			
" Mad river feeder, say	1	40	"			
					2	55 62
Total length of Canal, Side cut and Feeders					67	75 96

The cost of this Canal, Side cut and Feeders, including the sums paid for repairs, for strengthening and securing the banks, for lock houses, regulating weirs at the locks, &c., is \$746,852 70: or an average cost per mile, on 68 miles, nearly, \$10,983 12. Of this sum, there has been paid, up to the 1st of December, \$745,515 20; leaving at that date to be paid, the sum of \$1,337 50.

The estimate of the cost of this Canal, made in 1824, was \$673,520 00: to which add, the sum paid towards the construction of the Hamilton Side cut, \$2,000, making the sum of \$675,520 00, the estimated cost of the Canal, commencing at the Ohio river. Add to the actual cost, the sum of \$70,000, the probable cost upon the original plan, of connecting the Canal with the river at Cincinnati, and the excess of the actual and probable, over the estimated expenditure, will be shown.

This excess is attributable, mainly, to the very great deficiency in the first estimates of the quantities of earth to be removed on the sideling line, and to the difficulty and expense of sustaining a new Canal on sliding clay side hills; to an excess of the actual over the estimated cost of the stone work, growing out of the quality of the stone, and the difficulty of procuring it; to an increase of the height and substance of embankments in connection with the river, or exposed to its floods, made necessary by subsequent observation and experience; to the addition of much stone protection to the banks exposed to the floods of the river, and to foundations of mechanical structures; of pavement to the inner slopes of the Canal, in many instances, and at the head and foot of the locks, in all cases; of waste weirs, regulating weirs around the locks: with many other items of expenditure, found by experience to be necessary to the security and convenience of the Canal, which, in the original estimates, were not contemplated. The excess is also attributable in part, to a change of the plans of construction, in several instances, by sustaining the Canal over streams upon stone arches, at an additional cost, but with greater safety and permanency, where the original estimates were based upon structures of wood much less costly in the construction but less permanent and secure.

The amount of tolls collected on the lower division of this Canal, up to the 31st of December, is eight thousand and forty two dollars and seventy cents; to which should be added the sum received at the office at Hamilton, during the first three weeks of December, returns of which have not been received by the Board.

Awards have been made by the Board of Appraisers, within the past season, in favor of individuals, for damages sustained by them, mostly, in the destruction and injury of mills, small lots of ground which have been divided by the Canal, and for materials used in its construction, to the amount of \$5,508 70.

So far as damages have been awarded for materials used in the construction of the upper division of the Canal, the amount, by the terms of the contracts, is chargeable to the contractor for whose use the materials were taken. These sums are paid by the Acting Commissioner, out of the fund appropriated for the payment of awards, and are charged to the respective contractors.

A schedule of the awards made within the past year, is herewith submitted, marked A.

Payments of awards have been made up to the 1st of December, to the amount of \$5,053 25.

The business which has been done on this Canal during the past season, though comparatively small, has been sufficient to show that a very important trade may be expected to be done upon it when navigation shall be opened throughout the whole line, and the public confidence in its permanency fully established. The frequent interruptions to navigation which have occurred in the vicinity of Cincinnati, in consequence of the execution of the work necessary to the security of that part of the line, with the light head of water which prudence required should be given to the lower level, operated very materially to lessen the amount of transportation on it. Under such circumstances, it will not be expected that much business could be done on so short a line of Canal, as that which has been in partial use during the past season.

When the navigation shall be opened to Dayton, and the public confidence in it, as a speedy and sure means of transportation, shall be fully secured, a trade may be expected on it, both extensive and valuable to the country, and productive of revenue to an extent, which will equal the just anticipations of the State. It will afford the means of cheap and easy transportation to one of the finest districts of country west of the mountains, uniting the advantages of a productive soil and a salubrious climate with extensive facilities for the establishment of manufactories, and embracing a dense and industrious population. To that district of country, its propitious influence will be sensibly felt in the incentives to industry and enterprise which it will afford, by rewarding the exertions of both; and to the State, it will be a lasting monument of her wisdom and public spirit.

GENERAL REMARKS.

In accordance with the resolutions of the last General Assembly, surveys of the Stillwater and Kilbuck creeks, have been made, with the view of determining the practicability, the best method and probable expense of improving the navigation of those streams. The Engineer appointed to perform that service, has not yet made his report to the Board. The result of those surveys, will form the subject of a subsequent report.

It was understood that the Commissioners appointed by the act incorporating the "Sandy and Beaver Canal Company," did not wish the assistance of the Board in making examinations and surveys of the route for that Canal.— Nothing has therefore been done by the Board, or the Engineers in the service of the State, in relation to that subject.

The building of a lock in the dam to be erected across the Walhonding river, at the head of the feeder, has not been commenced. The language of the act passed at the last session of the General Assembly, seems to require the lock to be placed in the dam. This, it is apprehended, will be attended with very serious inconveniences, and will fail to produce the end contemplated. In order to allow sufficient water way for the passage of floods, the length of the dam will be considerably greater than the breadth of the river; the abutments being placed at some distance from the margin of the water, at its ordinary stage. If the lock be erected contiguous to either abutment of the dam, it will not therefore communicate directly with the channel of the river, without the aid of an artificial cut; and if placed in the stream at some distance from the abutment, it will be impossible to reach it with safety in high water.

for the purpose of managing the gates, except by the erection of a costly bridge, which will be exposed to great risk.

It will also be hazardous for a boat or raft descending the river, in high water, to attempt entering a lock placed any where between the abutments. The water, at the foot of a lock thus located, must be subject to violent agitation, in consequence of its proximity to the tumble of the dam, unless an extensive guard wall or pier, be erected, to prevent this effect.

In order to attain the end proposed, it will, in the opinion of the Board, be necessary to make a short Side cut, communicating with the river at a point where the violent agitation of the water, after passing over the dam, will have subsided, and below the bar which will, in all cases, be thrown up at some distance below dams built on gravel or sand foundations.

The guard lock at the head of the Feeder, may be made to answer the double purpose of passing boats round the dam, or through the Feeder into the Canal, by means of an additional gate: or should a lock be so placed, as to connect the Canal with the Walhonding or Muskingum, opposite the town of Coshocton, the same purposes will be accomplished, and the town of Coshocton, at the same time, accommodated with means of direct access to the Canal.

The building of a lock on either plan, will unavoidably be attended with considerable expense, on account of the great height to which the floods of those rivers rise, which is from 20 to 23 feet above low water mark. The plan of adding a third gate, with the necessary abutments to the guard lock at the head of the Feeder, will be much the least expensive.

It is proper to remark, that the apron or slope, connected with the dam, will be so long, and the descent from the top of the dam so gradual, that rafts may pass over with safety, in very high water.

From these considerations, a modification or repeal of the law on that subject, is respectfully recommended.

It is proposed to dispose of part of the water power, which has been created by the Canals, at Cincinnati, Akron and Cleveland, and probably at some other points on the Canals, early in the ensuing season. An absolute sale, or sale on permanent lease, of the right to use a stipulated quantity of water, so restricted as never to interfere with the navigation, it is believed may be effected on better terms, than can be obtained on leases for limited periods; as the latter method will not justify the erection of expensive and durable buildings for mills and manufactories. Authority to make permanent sales, reserving a yearly rent, or otherwise, as may be deemed most advantageous, is therefore respectfully solicited.

ISAAC MINOR,
BEN. TAPPAN,
N. BEASLEY,
JOHN JOHNSTON,
A. BOURNE,
ALFRED KELLEY,
M. T. WILLIAMS,

COLUMBUS, Jan. 6, 1829.

A.

Schedule of awards for damages on the Miami Canal, made by the Board of Appraisers, under dates July 4th, October 22d, and November 24th, 1828.

<i>In whose favor.</i>	<i>On what account.</i>	<i>D.</i>	<i>C.</i>	<i>D.</i>	<i>C.</i>
JULY 4th.					
Moses Vail	The destruction of a grist mill and mill site on the Miami river	4,000	00		
John Allen	Damage done his mill on the Miami river, by cutting off the communication between said mill and the surrounding country, and consequent deterioration in the value of the mill and other improvements	300	00		
Ira White	Timber taken for use of Canal	18	50		
Oliver Martin	Stone " "	2	50		
Stephen Hall	do " "	3	37		
Alexander Pindery	do " "	2	62		
Joseph Moore	do " "	59	75		
Moses M'Call	do " "	39	62		
Solomon M'Call	do " "	36	00		
John Hildebrand	do " "	5	18		
Ephraim Brown	do " "	16	87		
John Adams	Injury done a lot of land	150	00		
Jacob Madeira	do " " "	100	00		
Heirs of Joseph Ross	do " their farm	100	00		
Cincinnati Water Com'y.	Cutting and removing W. pipes	125	00	4959	41
OCTOBER 22d.					
Samuel Hughes	Injury to a crop of corn	12	50		
Hannah Kimes	do to a lot of land	60	00		
Frederick Cristman	do do do	40	00		
Heirs of Daniel Hawn	do do do	130	00		
Christian Kohr	do do do	60	00		
Nath. Woodward	do do do	10	00		
Alex. Cummins	do to a crop of oats	6	00		
Ethan Stone	Stone taken from his land	31	62		
John Coon	Timber do do do	57	75		
Isaac Vannest	do do do do	24	00		
Andrew Brininger	do do do do	25	38		
Heirs of Sam'l Rhoads	do and stone do	39	47		
Christian Hawn	do do do do	11	56		
John Taylor	Timber taken from do	5	50		
Trustees of section 16, T. 1, R. 8. M. R. S.	do do do do	1	00		
Andrew Emert	do do do do	4	00	518	78
NOVEMBER 24th.					
John Stoughtenborough	Timber taken from his land	10	12		
Abner Vannest	do do do do	20	40	30	52
TOTAL				5508	71

SPECIAL REPORT**CONCERNING KILBUCK AND STILLWATER CREEKS.**

To the General Assembly of the State of Ohio:

The Board of Canal Commissioners herewith present the Reports of the Engineers employed to make surveys and examinations of the Stillwater and Kilbuck creeks, with a view to the improvement of the navigation of those streams, agreeably to the resolutions of the last General Assembly. In these Reports, the principal Engineer, under whose superintendence the estimates of the costs of the proposed improvements have been made, has also joined.

The channel of the Stillwater from its mouth to the crossing of the road leading from Cadiz to Cambridge, by way of Morefield, offers peculiar facilities for an improved navigation, by means of locks and dams. The descent in the bed of the stream is uncommonly gradual, being less than one foot per mile, to average the whole distance—the bottom lands adjacent to the stream, are generally high and possess a nearly uniform elevation above the bed of the stream. The channel, though very serpentine, is uncommonly regular and uniform, both in depth and breadth, and is almost free from bars and ripples. Very little land will be overflowed in consequence of raising dams to the height necessary to create slack water between them. These features, though possessed by the whole valley of the Stillwater, below the Morefield road, in a greater or less degree, are peculiarly applicable to that part of it which extends from Freeport to the mouth of the creek. Above the Morefield road it is doubtful whether the navigation of the creek can be advantageously improved, on account of the small quantity of water flowing in dry seasons, the increased ascent in the bed of the stream, the want of sufficient elevation in the adjacent bottoms, and the great accumulation of drift wood in the channel.

The estimated expenditure necessary to create a slack water navigation, in the channel of the stream, by means of dams and locks, from its mouth to Freeport, 40 miles 16 chains, measuring the meanderings of the creek, is \$27,768 68; and from thence, to the crossing of the Morefield road, 9 miles 71 chains, is \$14,980 56: making an aggregate distance of 50 miles 7 chains, and a total estimated cost of \$42,749 24. The distance from the crossing of this road to the mouth of the creek, measured on a straight line, is nineteen miles.

The importance of the proposed navigation, to the counties of Harrison, Belmont and part of Guernsey, is too obvious to need illustration; and should the proposed improvements be effected by individual or public enterprise, a great accession of commercial business will undoubtedly be thrown into the Ohio Canal, equally beneficial to the country particularly interested, and to the public revenue.

The character of the Kilbuck is, in many respects, similar to that of the Stillwater. The average descent per mile, is about the same, and the breadth of the channel nearly equal. The Kilbuck, near its mouth, is however much more rapid than the Stillwater; and a communication between the mouth of the stream and the canal, is by no means so easily effected. In other respects, the valley of the Kilbuck is less favorable for the proposed improvement than the Stillwater. Many low bottoms occur, which must be overflowed by the erection of dams of the necessary height, to create slack water from one to another, unless the dams are more numerous than were contemplated in making the estimates now presented. The overflowing of these bottoms may be prevented by the construction of extensive levee banks and bank dams. These banks and drains have not been taken into view in making the estimates of the proposed improvement.

The estimated cost of constructing the necessary dams and locks, to create slack water navigation, from the mouth of Apple creek to a point about two miles from the junction of Kilbuck, with the Walhonding, is \$86,166 80. The distance, 68 miles 25 chains, measuring the meanderings of the stream; and the total amount of fall is 86 13-100 feet. The fall from the lower proposed dam on Kilbuck, to the surface of the water in the Walhonding Feeder Dam, is 26 91-100 feet. Between the head of slack water created by this dam and the place designated for the lower dam on the Kilbuck, the only feasible method of improving the navigation so as to make it useful, is believed to be by the construction of a canal, the expense of which, is not included in the estimates herewith presented.

The remarks made in relation to the utility of improving the navigation of Stillwater are applicable, at least to a considerable extent, to the navigation of the Kilbuck; the latter will not, however, probably change the direction of the commerce of so large a district of country.

Respectfully submitted.

By order of the Board,

COLUMBUS, JAN. 17, 1829.

ISAAC MINOR, *President.*

ESTIMATE

Of the Improvements on Kilbuck creek, January, 1829.

Dam, No. 1, intended to give 3 feet of water at the mouth of Apple creek—it is located 2 miles 7½ chains below—lift of lock, 4 feet.

15 sills and breast timbers, each 90 feet	1350	
90 rafters	15	1350
81 aprons	18	1458
9 do	29	261
		— 4419 at 7 309 38
30 round ties, laid and framed, at 50		15 00
1800 feet sheet piling, 2 inch oak plank, at 3		54 00
“ setting “ 180 feet run, at 12½		22 50
Excavation for foundation in channel, 120 yards, at \$1		120 00
do do of abutments, 384, at 30		115 20
do lock pit, 130 long, by 15 wide, 2913, at 15		436 95
do cross cut, 6 chains, 6 feet, a 2684, at 9		241 56
Gravelling above dam slope, 6 to 1, 321 at 30		96 30
Lock of wood, as estimated		1500 00
Foundation, gates and mitre sill		700 00
Embankment round lock and puddle, 1800, at 12½		225 00
do levee banks, 2700, at 10		270 00
2 dam abutments, each 30 feet long, 12 high and 6 thick,		
262 perches, at \$2 25		589 50
Protection at foot of lock and banks		150 00
		— \$4,878 94

Dam, No. 2, at 3 miles 73 chains—lock 4 feet lift.

14 sills and breasts, 60 feet	840	
60 rafters	15 “	900
54 aprons	18 “	972
6 do	29 “	174
20 round ties, framed and laid, at 50	2886 feet at 7	202 02
		10 00

1000 feet sheet piling, at 3	30 00
“ “ setting “ 100 feet run, at $12\frac{1}{2}$	12 50
Excavation for foundation in channel, 78 yards, at \$1	78 00
“ “ abutments, 275, “ at 30	82 50
“ for lock pit, 2648, at 15	397 20
“ cross cut, 10 chains, 5 00, a 3514, at 8	281 12
Gravelling dam, 240, at 30	72 00
Lock, abutments, &c., as per No. 1,	3,468 10

4,632 41

Dam, No. 3, at 7 miles 1 chain—lock 4 feet lift.

Timber in dam, same as in No. 2, adding 60 feet square timber, in all, 2946 feet, at 7	206 22
26 round ties, framed and laid, at 50	13 00
1200 feet sheet piling, at 3	36 00
“ “ setting “ 120 feet run, at $12\frac{1}{2}$	15 00
Excavation for foundation in channel, 133 yards, at \$1	133 00
“ “ of abutments, 302 “ at 30	90 60
“ lock pit, 2889 “ at 15	433 35
“ cross cut, 10 ch's, 6 00, a 4373 “ at 9	502 57
Gravelling dam, 282 “ at 50	141 00
Lock, abutments, &c.,	3,468 10

4,938 84

Dam, No. 4, 12 miles $10\frac{1}{2}$ chains—lock 5 feet lift.

14 sills and breasts, each 80 feet, 1120	
80 rafters 15 “ 1200	
72 aprons 18 “ 1296	
8 do 29 “ 232	
— 3848 at 7	269 36
20 round ties, framed and laid, at 50	10 00
1600 feet sheet piling, at 3	48 00
“ setting “ 160 feet run, at $12\frac{1}{2}$	20 00
Excavation for foundation in channel, 111 yards, at \$1	111 00
“ “ of abutments, 466 “ at 30	139 80
“ lock pit, 3130 “ at 15	469 50
“ cross cut, 5 ch's, 6 40, a 2441 “ at 9	219 69
Gravelling dam, 320 “ at 30	96 00
Lock, abutments, &c., see No. 1,	3,468 10

4,851 45

Dam, No. 5, at 19 miles—lock 5 feet lift.

Same as No. 4, adding 20 cents per yard for gravelling

4,915 45

Dam, No. 6, at 24 miles 30 chains—lock 6 feet lift.

17 sills and breasts, each, 100 feet, 100 rafters, each 17 feet,	
90 aprons, each 18, and 10 do. each 29, 5210 feet, at 7	364 70
36 round ties, framed and laid, at 50	18 00
2000 feet sheet piling, at 2	40 00
“ setting “ 200 feet run, at $12\frac{1}{2}$	25 00
Excavation for foundation in channel, 133 yards, at \$1	1 3 00
“ “ of abutments, 636 “ at 30	190 80
“ lock pit, 3120 “ at 15	469 50
“ cross cut, 4 chains, 5 00, a 4920 “ at 8	393 60
Gravelling dams, 711 “ at 50	355 50
Lock, abutments, &c.,	3,468 10

5,458 20

Dam, No. 7, at 27 miles—lock 6 feet lift.

15 sills and breasts, each 90 feet	1350		
90 rafters	15 "	1350	
81 aprons	18 "	1458	
9 "	29 "	261	
		<hr/>	
	4419 at 7	309	33
24 round ties, framed and laid, at 50		12	00
1800 feet sheet piling, at 2		36	00
" setting " 180 feet run, at 12½		22	50
Excavation for foundation in channel, 133 yards, at \$1		133	00
" " of abutments, 560 "		at 30	168 00
" lock pit, 3611 "		at 15	541 65
" cross cut, 6 chains, 7 feet, a 3312 "		at 9	298 08
Gravelling dam, 490 "		at 30	147 00
Lock, abutments, &c., see No. 1,		3,468	10
		<hr/>	

5,135 66

Dam No. 8, at 30 miles 60 chains—lock 5 feet lift.

15 sills and breasts, each 83 feet	1245		
83 rafters	15 "	1245	
75 aprons	18 "	1350	
8 "	29 "	232	
		<hr/>	
	4,072 at 7	285	04
24 round ties, framed and laid, at 50		12	00
14 feet sheet piling, at 2		28	00
" setting do 140 feet, at 12½		17	50
Excavation for foundation in channel, 133 yards, at \$1		133	00
" " of abutments, 311 "		at 30	93 30
" lock pit, 2889 "		at 15	433 35
" cross cut, 6 chains, 6 80, a 3182 "		at 9	286 38
Gravelling dam, 375 "		at 30	112 50
Lock, abutments, &c., see No. 1,		3,468	10
		<hr/>	

4,869 17

Dam, No. 9, at 34 miles 14 chains—lock 7 feet lift.

20 sills and breasts, each 120 feet	2400		
120 rafters	16 "	1920	
108 aprons	18 "	1944	
12 "	29 "	348	
		<hr/>	
	6612 at 7	462	84
60 round ties, at 50		30	00
2400 feet sheet piling, at 2		48	00
" setting " 240 feet, at 12½		30	00
Excavation for foundation in channel, 178 yards, at \$1		178	00
" " of abutments, 693 "		at 30	207 90
" lock pit, 3130 "		at 15	469 50
" cross cut, 4 chains, 4 00, a 1056 "		at 8	84 48
Gravelling dam, 1307 "		at 30	392 10
Lock, abutments, &c., see No. 1,		3,468	10
		<hr/>	

5,370 92

Dam, No. 10, at 39 miles—lock 7 feet lift.

Timber and sheet piling as per No. 9,	570	84
Excavation for foundation " "	385	90
" " lock pit, 4333 yards, at 15	649	95
" cross cut, 6 chains, 6 00, a 2684 "	at 9	241 56

Gravelling, 1307 yards, at 30	392 10	
Lock, abutments, &c., see No. 1,	3,468 10	
	<hr/>	5,708 45

Dam No. 11, at 45 miles 28 chains—lock 8 feet lift.

18 sills and breasts, 100 feet 1800		
100 rafters	16	1600
90 aprons	18	1620
10 do	29	290
	<hr/>	5310 at 7
		371 70
30 rounds ties		at 50
		15
2000 feet sheet piling, at 2		40
„ setting do 200 feet, at 12 1-2		25
Excavation for foundation of channel, 155 yds. at \$1 00		155
do abut's, 607 yds. at 30		182 10
do. lockpit, 4911 yds. at 20		982 20
do. cross cut, 8 chains, 7 00, a 4414 yds. at 9		397 20
Gravelling dam, 900 yds. at 30		270
Lock, abutments, &c. see No. 1,		3468 10
	<hr/>	5906 36

Dam No. 12, at 54 miles 16 chains—lock 8 feet lift, at Fox's mill.

20 sills and breasts, each 150 feet 3000		
150 rafters	16	2400
135 aprons	18	2430
15 do.	29	435
	<hr/>	8265 at 7
		578 53
70 round ties, at 50		35
3000 feet sheet piling, at 2		60
„ setting do. 300 feet, at 12 1-2		37 50
Excavation for foundation in channel, 333, at \$1 00		333
do. slate of abut's, 66, at 50		33
do. lockpit, 6404, at 20		1280
Gravelling, 1734, at 30		520 20
Excavation cross cut, 8 chains, 9 00, a 6292, at 10		629 20
Lock, abutments, &c. deducting 1 abutment,		3156 55
	<hr/>	6662 30

Dam No. 13, at 66 miles—lock 8 feet lift,

23 sills and breasts, 180 feet 4140		
180 rafters	16	2880
162 aprons	24	3888
18 do.	36	648
	<hr/>	11556 at 7
		808 92
110 round ties, at 50		55
3600 feet sheet piling, at 2		72
„ setting do. 320 feet, at 12 1-2		40
Excavation for foundation in channel, 200 yds. at \$1 00		200
do. do. of abutments, 653 yds. at 30		195 90
do. lockpit, 4911 yds. at 20		982 20
Gravelling, 2880 yds. at 30		864
Lock, abutments, &c. see No. 1.		3468 10
	<hr/>	6686 12
Clearing 20 miles from the mouth of Apple creek, 2 rods wide on each side, including the removal of drift, at \$200 per mile,		4000

Clearing 46 miles, from thence to dam No. 13, in same manner, at \$250 per mile,

11500

15500

Protection stone and brush at foot of dams, \$50 each

650

Add for contingencies, 10 per cent.

86,166 80

8,616 68

Total, \$94,783 48

This brings the improvement of the stream to within 2 miles of its mouth, and as far down as it is practicable, by dams and locks.

Whole distance from the mouth of Apple creek, to the mouth of Kilbuck,

68 miles 25 chains.

Amount of fall in same distance at low water,

86. 13 feet.

Fall from top water line of dam No. 13, to top water line of feeder dam, across White Woman,

26. 91 feet

REMARKS.

In the examinations made with a view of improving the Kilbuck, several difficulties have presented themselves; more especially in the first 20 miles from the mouth of Apple creek. These difficulties, although not insurmountable, will very much enhance the cost of any permanent improvement. The most prominent of these, is the irregularity of the bottoms bounding the stream; making it necessary either to construct a great number of small dams, or by constructing larger ones, to overflow a considerable extent of low ground. The dams have been located with a view to the latter course, but the cost of the levee banks required to confine the water to its natural channel, and the necessary drains from each level to the next below, have not been estimated. This would very materially increase the expense; and in order to determine with any degree of accuracy the amount, much careful examination would be required on both sides of the stream; besides, it was considered preferable at this time to overflow some portion of unimproved land, than to encounter the expense of completely draining it. Another considerable item of expense is found in clearing away the heavy drifts, which in many places choke up the channel; and the price of clearing for the first 20 miles, is chiefly intended to cover that expense.

The last 40 miles, present fewer difficulties. The site of dams Nos. 8 to 13, are very favorable, and although many low and marshy places will necessarily be overflowed, the banks generally, are high enough to confine the water. Dam No. 13, is about 2 miles above the mouth of Kilbuck, and as far down as improvement by dams and locks is practicable.

To connect these improvements, with the Ohio Canal, an artificial communication must be made from the dam, to the back water of the feeder dam across White Woman. As this did not appear to be contemplated by the resolution, an examination of the line was not made.

For any ideas respecting the improvement of this valley by Canals, we beg leave to refer to the report of the Hon. Canal Commissioners of January 8th, 1825.

DAVID S. BATES, *Principal Engineer,*
FRANCIS CLEVELAND, *Assistant.*

Engineers' Estimate and Report on the proposed improvement of Stillwater.

DIVISION No. 1.

Dam No. 1, at 63 miles, 71 chains—lock 2 feet lift.

12 sills and breast timbers, each 63 feet 12 by 12	756
57 apron timbers, each 18 feet do	1026
6 do. do 29 do	174
63 rafters 15 do	945
<hr/>	
Framed and laid, 2901, feet, at 7,	\$203 07
12 round ties, do 15 feet long, at 50	6 00
1260 feet sheet piling, at 2	25 20
Setting do 63 feet, at 12 1-2	7 87½
Excavation for foundation in channel, 71 yds. at \$1	71 00
do in slate rock, 68 yds. at 50	34 00
do in foundation and abutment, 189 feet, at 30	56 70
do lockpit, 2400 yds. at 15	360 00
do cross cut, 8 chains, 5,90, 3500 yds. at 8	280 00
Abutment for dam, 30 feet long, 12 feet high, and 6 feet thick, 131 perches, at \$2	262 00
Timber foundation for do laid, 420 feet, at 4	16 80
Lock of wood, as per calculation	1500 00
Foundation for do and gates	700 00
Embankment for do 1900 yds. at 12 1-2	225 00
do for levee bank, 2700 yds. at 10	270 00
Stone protection	100 00

\$4117 00*Dam No. 2, at 62 miles, 15 chains—lock, 4 feet lift.*

15 sills and breasts, each 71 feet long, 1065 feet	
7 rafters, " 15	1065
61 aprons, " 18	1152
7 do " 29	203
<hr/>	
—3485 feet, at 7	243 95
24 round ties, " 15 laid, at 50	12 00
700 feet sheet piling, at 2	14 00
Setting do 66 feet, at 12 1-2	8 25
Excavating foundation in channel, 71 yds. at \$1	71 00
do slate rock, 106 yds. at 50	53 00
do foundation of abutment, 222 yds. at 30	66 60
do lockpit. 2530 yds. at 15	379 50
do cross cut, 10 chains, 4,50, 3067 yds. at 8	245 36
Lock, abutment, protection embankment, levee, foundation, &c. as per No. 1.	3073 80

\$4167 46*Dam No. 3, 60 miles, 38 chains—lock 4 feet lift.*

14 sills and breasts, each 65 feet	9 0 feet
65 rafters, " 15	975
59 aprons, each 18 feet, 6 do each 29 feet, 1236	
<hr/>	
—3121, at 7	218 47
24 round ties, 15 laid, at 50	12 00
1000 feet sheet piling, at 2, setting 50 feet, at 12 1-2	26 25
Excavating foundation bed of stream, 71 yds. at \$1	71 00

Excavation of slate rock, 111 yds. at 50	55 50
do foundation of abutment, 136 yds. at 30	40 80
do lockpit, 2648 yds. at 15	397 20
do cross cut, 5 chains, 5 feet, a 1760 yds, at 8	140 80
do below dam, 5 chains, 24 by 2, 587 yds. at 20	117 40
Lock, abutment, &c.	3073 80
	<hr/>
	\$4153 22

Dam No. 4, at 58 miles, 63 chains—lock 3 feet lift.

14 sills and breasts, at 70 feet, 980 feet	
70 rafters " 15 1050	
63 aprons " 18 1134	
7 do " 29 203—3367, at 7	235 69
24 round ties laid, at 50	12 00
1400 feet sheet piling, at 2	28 00
Setting do 140 feet, at 12 1-2	17 50
Excavation for foundation in channel, 150 yards, at \$1	150 00
do for abutments on each side, 360 " at 30	108 00
do lockpit, 2400 " at 15	360 00
do cross cut, 10 chains, 5 feet, 3520 " at 8	281 60
Lock, abutment, &c. adding one abutment,	3335 80
	<hr/>
	4528 59

Dam No. 5, at 57 miles, 32 chains—lock 5 feet lift.

Timber in dam, same as No. 2,	255 95
1400 feet sheet piling, at 2	28 00
Setting do 140 feet, at 12 1-2	17 50
Excavation for foundation in channel, 71 yards, at \$1	71 00
do do of abutments, 566 yards, at 30	169 80
do lockpit, 2934 yards, at 15	440 10
do cross cut, 12½ chs. 5 20, 4532 yds. at 8	362 56
Lock, abutments, protection, &c. as per No. 4,	3335 80
	<hr/>
	4680 71

Dam No. 6, at 54 miles, 68 chains—lock 4 feet lift.

14 sills and breasts, each 72 feet, 1008	
72 rafters, " 15 1080	
65 aprons, " 18 1170	
7 do " 29 208—3461 feet, at 7	242 27
24 round ties laid, at 50	12 00
700 feet sheet piling, at 2	14 00
Setting do 70 feet, at 12 1-2	8 75
Excavation for foundation in channel, 71 yards, at \$1	71 00
do do on side earth, 70 " at 8	5 60
do do same stone, 71 " at 50	35 50
do do of abutment 233 " at 30	69 90
do lock pit, 2768 " at 15	415 20
do cross cut, 10 chains, 5 50, 3984 " at 8	318 72
Lock, abutment, protection, &c. as per No. 1,	3073 80
	<hr/>
	4266 74

Dam, No. 7, at 52 miles, 20 chains—lock 4 feet lift.

Timber for dam, same as No. 6,	254 27
1000 feet sheet piling, at 2	20 00
Setting do 100 feet, at 12½	12 50
Excavation for foundation in channel, 89 yards, at \$1	89 00
do slate point, 78 yards, at 50	39 00

do foundation of abutment, 233 yards, at 30	69 90	
do lock pit, 2888 yards, at 15	433 20	
do cross cut, 8 chains, 6 feet, 3580 yards, at 8	286 40	
Lock, abutment, protection, &c. as per No. 1,	3073 80	4278 07

Dam, No. 8, at 50 miles, 7 chains—lock 5 feet lift.

15 sills and breasts, each 60 feet, 900		
60 rafters, " 15 " 900		
54 aprons, " 18 " 972		
6 do " 29 " 174—2946 feet, at 7	206 22	
24 round ties laid, at 50	12 00	
1060 feet sheet piling, at 2	21 20	
Setting do 106 feet, at 12½	13 25	
Excavation, foundation in channel, 91 yards, at \$1	91 00	
do slate rock, 62 yards, at 50	31 00	
do foundation of abutment, 200 yards, at 30	60 00	
do lock pit, 3033 yards, at 15	454 95	
Lock, abutment, protection, &c. as per No. 1,	3073 80	3963 42
Gravelling Dam No. 1, 142 yards, at 30	42 60	
do do No. 2, 387 " at 30	116 10	
do do No. 3, 260 " at 30	78 00	
do do No. 4, 307 " at 30	92 10	
do do No. 5, 381 " at 30	114 30	
do do No. 6, 352 " at 30	105 60	
do do No. 7, 288 " at 30	86 40	
do do No. 8, 266 " at 30	79 80	714 90
Clearing two rods wide on each side of stream, including the removal of drift, 16 miles, 6 chains, at 250 dollars per mile,		4050 00
		\$38,920 75

END OF DIVISION No. 1.

This brings the estimate down to the first dam above the main road leading to Cadiz, via Morefield.

DIVISION 2.

Dam No. 9, at 47 miles, 23 chains—lock 5 feet lift.

(Near the crossing of main road leading to Cadiz, by Morefield, which is distant about 3 miles; and near the proposed crossing of two graded roads.)

Timber, same as No. 8,	218 22
900 feet sheet piling, at 2	18 00
Setting do 90 feet, at 12½	11 25
Excavation for foundation in channel, 71 yards, at \$1	71 00
do slate, 61 yards, at 50	30 50
do foundation of abutment, 240 yards, at 30	72 00
do lock pit, 2983 yards, at 15	447 45

do	cross cut, 4 chains, 5 40,	1555 yards, at 8	124 40
Lock, abutment, protection, &c. as per No. 1,			3073 80
Gravelling 326 yards, at 30			97 80

 4164 42

Dam No. 10, at 44 miles, 51 chains—lock, 5 feet lift.

17 sills and breasts, each 80 feet	1360	
80 rafters	16 "	1280
72 aprons	18 "	1296
8 "	29 "	232—4168 feet, at 7
40 round ties laid, at 50		20 00
1400 feet sheet piling, at 2		28 00
Setting do 140 feet, at 12 1-2		17 50
Excavation for foundation in channel, 133 yds. at \$1 00		133 00
do rock, 66 yards, at 50		33 00
do foundation of abutments, 183 yards, at 30		54 90
do lock pit, 3130 yards, at 15		469 50
do cross cut, 8 chains, 6 feet, 3578 yards, at 8		286 24
Gravelling 622 yards, at 30		186 60
Lock, abutment, protection, as per No. 1,		3073 80

 4594 30

Dam No. 11, at 40 miles, 16 chains—lock 5 feet.

Timber same as No. 10,		311 76
1300 feet sheet piling, at 2		26 00
Setting do 126 feet, at 12 1-2		15 75
Excavation for foundation in channel, 118 yards, at \$1		118 00
do rock, 11 yards, at 50		55 50
do foundation of abutment, 266 yards, at 30		79 80
do lock pit, 2920 yards, at 15		438 00
do cross cut, 8 chains, 5 50 3186 yards, at 8		254 88
Gravelling 622 yards, at 30		186 60
Lock in form of guard lock; 4 abutments, each 29 feet long, '8 high, 7 feet at bottom, 4 at top, and breast, 15 by 4 by 6, in all 718 per. at \$2		1436 00
Foundation		190 00
Gates and mitre sill		350 00
Abutments, embankment and protection, as before		873 80
Pavement and slope wall, 62 by 45 by 1, 170 per. at 40		68 00

 4404 09

Clearing 2 rods wide on each side of the stream, including the removal of drifts, 9 miles, 71 chains, at 200 dollars per mile,

 1817 75

 14,980 56

End of Division No. 2, to the first dam above Freeport,

Amount of Division No. 1, brought over

 38,920 75

Total of Divisions Nos. 1 and 2,

 53,901 31

DIVISION No. 3.

Dam No. 12, at 35 miles, 56 chains, Easley's lower mill—lock 7 feet lift.

23 sills and breasts, each 100 feet,	2300	
90 aprons	18	1620
10 do	29	290
100 rafters,	16	1600—5810 feet, at 7
60 round ties laid, at 50		30 00
1600 feet sheet piling, at 2		32 00
Setting do 160 feet, at 12 1-2		20 00
Excavation for foundation in channel, 156 yards, at \$1		156 00
do do of abutment, 375 yards, at 30		112 50
do slate rock, 66 yards, at 50		33 00
do lock pit, 3370 yards, at 15		505 50
do cross cut, 10 chains, 6 feet, 4470, at 8		357 60
Gravelling 1111 yards, at 30		333 30
Lock, abutment, &c. as per No. 11,		2967 80

 4904 40

Dam, No. 13, at 29 miles, 56 chains—lock 9 feet lift.

Timber same as No. 12,		436 70
Sheet piling do		52 00
Excavation for foundation in channel, 178 yards, at \$1		178 00
do do of abutment, 363 yards, at 30		108 90
do rock, 78 yards, at 50		39 00
do lock pit, 4680 yards, at 15		702 00
do cross cut, 9 chains, 7 feet, 4666 yards, at 9		446 94
Gravelling 1111 yards, at 30		333 30
Lock, abutment, &c. as per No. 11,		2917 80

 5214 64

Dam No. 14, at 19 miles, 52 chains—lock 10 feet lift.

At Talbot's Mill.

26 sills and breasts, each 100 feet,	2600	
100 rafters	20	2000
90 aprons	24	2160
10 do.	40	400—7160 feet, at 7
60 round ties,	20	at 60
1800 feet sheet piling, at 2		36 00
Setting do 180 feet, at 12 1-2		22 50
Excavation for foundation in channel, 133 yards, at \$1		133 00
do do for abutment, 252 yards, at 30		75 60
do slate, 119 yards, at 50		59 50
do lock pit, 4680 yards, at 15		702 00
do cross cut, 9 chains, 6 feet, 4026 yards, at 9		362 34
Gravelling 2177, at 30		653 10
Lock, abutment, &c. &c. same as per No. 11,		2917 80

 5499 04

Dam No. 15, at 5 miles, 27 chains—lock 10 feet lift.

At Uhrich's Mill—Present dam raised.

400 feet timber, at 7	28 00
20 ties, at 50	10 00

Excavation lock pit, 6789 yards, at 20	1357 80	
do below dam, 24 by 1, 50 by 14 chains, 1232 yards, at 20	246 40	
do cross cut, 8 chains, 11 50, a 9022 yards, at 10	902 20	
Gravelling 444 yards, at 30	133 20	
Lock, &c. deducting abutment,	2639 00	
		5316 60
Clearing 2 rods on each side, including removal of drift, 40 miles, 16 chains, at \$170 per mile,		6834 00
		<u>\$27,768 68</u>

End of Division No. 3.

RECAPITULATION.

Division No. 1, 16 miles, 16 chains	38,920 75
" " 2, 9 " 71 "	14,980 56
" " 3, 40 " 16 "	27,768 68
Whole length, 66 ms. 23 chs.	<u>\$81,669 99</u>

The above estimates, with the exception of clearing, would improve the stream to the mouth of Sugar creek Fork.

To make slack water navigation, to the junction of Grove's and Spencer's Forks, three additional dams will be necessary, in all respects similar to Dam No. 1, which will amount to

	12,480 72
	<u>\$94,150 71</u>
Protection of brush and stone at the foot of 15 locks and dams, at 50 dollars per dam	750 00
	<u>\$94,900 71</u>
Add for contingencies, 10 per cent.,	9,490 07
	<u>\$104,390 78</u>
Total,	
Whole amount of fall in low water, 83 feet, 76 hundredths.	

REMARKS.**DIVISION, No. 1.**

This Division extends from the Three Forks, to a point half a mile south of the crossing of the main road leading to Cadiz. Owing to the uniform low bottom along this division, the improvement is rendered very expensive; in addition to which, it is considered wholly impracticable to fill the dams with water, during three months in each year. The Three Forks united, do not afford in a dry time, more than four or five cubic feet of water, per minute; and the accessions below are inconsiderable.

DIVISION, No. 2.

This Division extends from a point near the main road leading to Cadiz, via Morefield, distant three miles, to Freeport. There are two additional roads

which will probably cross near the upper end of this division, leading to fertile and well cultivated sections of country. All the dams in this division can be sufficiently supplied with water during the dry season, to meet the demand of a very considerable business.

DIVISION, No. 3.

This Division extends from Freeport, to the mouth of Stillwater, and communicates with the Tuscarawas Feeder dam, with the Ohio Canal. This division can be abundantly supplied with water, and would afford a market for the surplus productions of an extensive and fertile country. Coal is found in great abundance, near the immediate banks of the stream. The cost of this division is probably as light as that of the improvement of any other stream of the same length in the State.

The character of this stream, with one exceptionable feature, is very favorable for its improvement by slack water navigation. The declivity of its channel, and of the bottom land bounding it, is gentle and uncommonly uniform. There are few ripples, and those few generally found immediately below dams, where the action of the water has thrown up a bar. The immediate banks are very regular, presenting for many miles, a slope similar to that of a Canal bank, and in many places equally as uniform. With scarcely one exception, even in the most crooked parts of the stream, the alluvial banks show no appearance of being strongly washed, or a liability to undermine and fall in. Wherever peninsulas have been cut off, it appears to have been by a slow process, and the work of many successive floods.

The exceptionable feature alluded to, is found in the numerous bluff points and rocky side hills, washed by this stream. In most cases of improvement, it is from experience asserted, that the public and general interest is better subserved by constructing Canals wherever they are practicable, than by locks and dams in a stream. The situation and very meandering character of this stream, would seem to make Canalling in its valley, very difficult. The course of it is often, and almost always, arrested by high bluffs, against which the stream flows; and from which it recoils to the opposite sides, and at every point of contact, presents a bluff and washed bank. Should it be thought expedient in improving this navigation, to construct a towing path, these bluffs are a severe obstacle; and the difficulty would in some measure be increased in the construction of a Canal, from the necessity of frequently cutting across bends, and as frequently forming a new channel for the creek.

This might be done; and in doing it, the line of navigation made much shorter than that proposed by the creek; and although the lockage would be the same, the number of locks would be lessened, as also the number of dams. As the resolution of the Legislature did not contemplate an improvement of this kind, which would be more costly than that of improving the creek, I have not taken observations sufficient to show a contrast of the expense.

The proposed improvement of the stream, will destroy the present mill dams as far down as Freeport; but in most cases without injuring the community. All of them, with the exception of Nos. 1 and 4, can be advantageously made use of for mill purposes, by means of reaction wheels, during those seasons of the year, when water is abundant, and for nearly as great a portion of the time, as the present ones can be profitably employed. The site of Eirly's mill dam, at Freeport, could not be made use of in the location of Dam, No. 11. This dam, although further up the stream, is no further from the village of Freeport, and can be made more serviceable, than the present one. Dams, No. 12, 14 and 15, are located respectively at Eirly's, Talbot's and Uhrich's mills. No. 13, is a short distance above Norris' mill, but might be carried down without any serious injury, though the site is not as favorable.

It is thought that the four last mentioned dams will be considerably improved, and the hydraulic privileges, rendered more valuable, during the greatest part of the year.

The injury done to private property, in other respects, will be trifling. A few bayous of limited extent, and a few old channels of the stream, will be filled with water; but the lands thus overflowed, are at present unfit for cultivation; and it is thought, by being kept constantly filled with water, they will be less detrimental to the health of the inhabitants, than they are in their present situation.

January 15, 1829. I have particularly examined every part of the above survey and report, and beg leave to submit the same, connected with the Engineer, who has performed the service.

DAVID S. BATES,
Principal Engineer.
FRANCIS CLEVELAND,
Assistant.

FIFTH ANNUAL REPORT OF THE FUND COMMISSIONERS.

COLUMBUS, DECEMBER 9, 1829.

To the General Assembly of the State of Ohio:

The Commissioners of the Ohio Canal Fund, in pursuance of the duty required of them by law, respectfully submit the following statement in relation to the Fund they have in charge:

RECEIPTS.

Balance as per report of 5th Jan'y last	611,517 31
Interest rec'd from B. Tevis and others	38 44
Borrowed from the Sinking Fund	10,000 00
Appropriation from the general revenue	10,000 00
Canal revenue of 1828	86,725 18
Tolls, donations, &c., to February, 1829	8,761 22
Amount of deposit in Treasury for tolls, to 15th of August	2,463 71
Interest rec'd from Manhattan Company, for deposit, 1828	26,724 22
Received on account of the loan of 1828	1,060,535 30
Total	<u>\$1,816,765 38</u>

PAYMENTS.

Repaid Virginia Military School Fund	46,420 43
do interest on same	2,785 23
do U. S. Military School Fund	3,718 28
do interest on same	223 09
do amount rec'd for sale of Salt Reserve	4,892 75
do interest on same	293 56
	<u>68,333 34</u>

Expenditures on the Canals.

Paid to contractors, by the L. O. Bank	444,150 46
do for contingent expenses; do	19,049 97

do	expenses of the Canal Board	456 51	
do	awards for damages	349 04	
do	to contractors, by the Western Reserve Bank	310,470 98	
do	for contingent expenses	17,516 95	
do	award for damages	75 00	
			792,068 91
do	Manhattan Company, for sundry expenses		305 13
Interest	account, to Prime, Ward, King & Co.	22 96	
do	stockholders, July 1, 1828	62,007 24	
do	contractor for loan	3,359 82	
do	stockholders, Jan'y 1, 1829	82,195 90	
do	do July 1, 1829	106,926 01	
do	Western Reserve Bank, interest advanced payments, 1828-29	2,257 01	
			256,768 94
Balance	remaining on hand		709,289 06
Total			<u>\$1,816,765 38</u>

The balance of the Fund is deposited as follows:

In the	Manhattan Company	646,668 95
do	Lancaster Ohio Bank	38,826 08
do	Western Reserve Bank	23,357 68
E. Buckingham,	on account of his expenses	257 03
S. Perkins,	do do	130 57
E. A. Brown,	do do	48 75
Total		<u>\$709,289 06</u>

From this balance there will be required for the payment of interest, 1st Jan'y next, as estimated 112,000 00
 There will also be required for expenditures on the Canals, up to that period—estimated 100,000 00

There is yet to be received on account of the loan of 1828, \$19,464 $\frac{7}{100}$, and for interest on deposits in the Manhattan Company, for the present year, estimated at \$25,000—which would leave for expenditures on the Canals, after the 1st of Jan. next, \$522,289 $\frac{6}{100}$.

Respectfully submitted,

E. A. BROWN, }
 E. BUCKINGHAM, } *Comr's.*

DECEMBER 5, 1829.

EIGHTH ANNUAL REPORT OF THE BOARD OF CANAL COMMISSIONERS.

COLUMBUS, JANUARY 9, 1830.

To the General Assembly of the State of Ohio:

THE Board of Canal Commissioners have the satisfaction of being able to state, that the northern division of the Ohio Canal, extending from Lake Erie, to the north end of the Deep Cut, at the

Licking Summit, one hundred and ninety miles, is now very nearly completed. A few sections between Dover, in Tuscarawas county, and Caldersburgh, in Coshocton county, are not entirely finished; but with the employment of a moderate force, a few days only will be required to put them in a state of readiness, to receive water for navigation. A small amount of work, also, remains to be done, in order to finish the Tuscarawas and Walhonding Feeders.

Strong hopes were entertained in the early part of the season, that this division of the Canal would be completed in the month of August or September; and that Canal navigation would be extended to the town of Newark, during the fall. Could these hopes have been realized, a great increase of business and revenue would have been the necessary result. A few cases of sickness which occurred in the early part of the summer, produced an alarm and consequent desertion of the line by most of the laborers; and, although the ensuing part of the season, proved rather healthy than otherwise, it was found extremely difficult to dispel their fears, and induce them to return.—Notwithstanding the use of all reasonable exertions on the part of the Acting Commissioner, as well as of most of the contractors, to urge forward the work, we were compelled to submit to an extension of the time for completing this part of the Canal.

Water has been introduced into most of the levels between Massillon and the Licking Summit, to a moderate depth, in order to test the banks, and gradually to give them strength and solidity. In these partial trials of the Canal with water, but one breach of any considerable magnitude, has occurred.—This, which was at Miller's Bluff, about four miles below Caldersburgh, is now partly repaired, and will be finished so as not to retard navigation in the spring.

About one third part of the tumble of the dam across the Walhonding river, at the head of the Feeder, while in an unfinished state, was swept away by the high water. The remaining part of the dam, and the abutments, which are the most important and expensive parts of the structure, are un injured.

The cause of this damage has not been satisfactorily ascertained. It is, however, believed, that some of the piles, of which the dam is in part composed, were not driven as deep as required by the plan of the work; and the gravelling and puddling were not completed.

That part of the Canal, which this Feeder was designed to supply, can be abundantly filled with water from other sources, except in the driest part of the season, previous to which time the dam will be repaired. The navigation of the Canal will not, therefore, be suspended or interrupted on account of this accident.

The Canal has been filled with water to a depth sufficient for the passing of boats from the Lake, as far south as Dover, in Tuscarawas county; and has actually been navigated as far as Zoar, upwards of 82 miles from Cleaveland. It is expected that the whole line from Lake Erie to Newark, about 180 miles, will be opened for navigation early in the spring.

The whole line of Canal between the Licking Summit and the Ohio river, 119 miles, together with the Columbus Feeder, 11 miles, is now under contract, to be completed, agreeably to the terms of the contracts, at different periods, previous to the 1st day of June, 1831. The whole line of Canal, except that part of it which is finished, is now under contract.

On that division of the unfinished line which extends from the Licking Summit to Deer creek, 8 miles north from Chillicothe, 60 miles in length, about one half of the value of the work is already done. On the remaining division, extending from Deer creek to the Ohio river, 59 miles, operations have been

lately commenced, and but a comparatively small portion of the work has been done.

The sum paid to contractors, agents and superintendents, for construction, up to the 1st day of December, 1829, on that division of the Canal, which may be considered as virtually finished, extending from the Lake to the Licking Summit, including the Reservoir and Feeders not navigable, is \$1,916,324 77

The estimated sum necessary to pay balances due to contractors and agents, when their work shall have been fully completed and accepted, is 21,204 63

Making the whole cost of constructing this division of the Canal, including all sums expended in improvements and repairs, up to December 1, 1829 1,937,529 40

The sum paid to contractors and agents, for the construction of the Tuscarawas and Walhonding Feeders, up to December 1, 1829, is 39,704 85

The estimated sum necessary to pay balances and finish the work, is 9,036 89

Making the total cost of these Feeders 48,741 74

Aggregate cost of the Canal north of the Licking Summit, including Feeders and Reservoirs \$1,986,271 14

The sum paid to contractors on the Muskingum Side cut, or branch Canal, up to December 1, 1829, is 16,995 69

The sum remaining to be paid to finish the work, is 18,404 31

Making the total cost of this branch Canal 35,400 00

The sums paid to contractors on the division of the Canal, which extends from the Licking Summit, to the Ohio river, 119 miles, up to December 1, 1829, is 359,422 44

The estimated sum necessary to be paid, in order to finish this division, is 1,141,791 38

Making the total cost of this division 1,501,213 82

The total amount of work certified to have been done on this division, up to this time, is 415,769 54

The sum paid to contractors on the Columbus Feeder, up to December 1, 1829, is 3,920 00

The estimated sum necessary to finish the Feeder, is 57,563 00

Making the total cost of the Columbus Feeder 61,483 00

Aggregate amount of money paid contractors, agents and superintendents, for construction of the Ohio Canal, including Reservoirs, Feed-

ers, &c., also, the expenses of repairs and improvements, to December 1, 1829	\$2,336,367 75	
Sum remaining to be paid in order to finish the same	1,248,000 21	
<hr/>		
Making the aggregate cost of constructing the Canal, Side Cut, Feeders, Reservoir and other works, including repairs, to December 1, 1829	3,584,367 96	
The total amount paid for engineering and superintending work on the Ohio and Miami Canals, together with such other surveys and examinations, as have been made by direction of the General Assembly, from the commencement of the year 1825, to December 1, 1829, is, by Alfred Kelley	68,494 68	
By M. T. Williams	75,857 39	
	<hr/>	144,352 07
Within the same period, there has been paid for the purchase of real estate, for the use of water power on the Ohio Canal, by A. Kelley	1,300 00	
By M. T. Williams	296 40	
On the Miami Canal, by do do	100 00	
	<hr/>	1,696 40
The total sum paid within the same period, for damages, awarded on account of land and materials, used in the construction of the Ohio Canal, is by A. Kelley	2,252 00	
By M. T. Williams	1,223 00	
On the Miami Canal, by do do	9,840 12	
	<hr/>	13,315 12

The estimates here presented of the sums required to finish the work south of the Licking Summit, are predicated on the prices specified in the contracts made for its completion, and upon the quantities of each item of work calculated from the measurement made on a final location and laying out of the Canal, and are believed to approximate very near to the truth. The abandonment of jobs, and the consequent necessity of re-letting at different prices, may vary the final result. To what extent this cause will operate, it is impossible to foresee.

The statement of money expended in the construction of the Canal, and the estimate on the sums required to finish the work, does not include the expenses of engineering and superintending the construction. It is impossible to distribute accurately, the expenditure on this account, between the two Canals, or between the different divisions of the main Canal; nor can an accurate estimate be formed of the amount required to defray this class of expenses, until the completion of the work.

That part of the Ohio Canal which has been navigated during the past season, extending from the Lake to Massillon, 66 miles, has acquired such a degree of permanency and strength as to need very small expenditures for repairs. It is believed that the cost of repairing breaches and removing bars and slips on this division of the Canal for the year past, does not exceed five hundred dollars.

The work which remained to be done, at the date of our last annual Report, on this part of the Canal, has mostly been finished. The excavation of section number one, south of the Lake, on the Portage Summit, has been completed; the placing of stone on the banks, to secure them from the effects of

high water, and the raising and securing of the places which were deemed unsafe, have been nearly finished. The lower sloop lock at Cleaveland, has been completed, and a small amount of earth at the head and foot of the lock, only remains to be excavated in order to finish the northern termination of the Ohio Canal. This will be done as soon as favorable weather will permit; and but limited expenditures, it is believed, will hereafter be required on this division of the Canal.

In the commencement of our operations, many things were omitted which are now deemed necessary to the convenient use and safety of the Canal.— Experience has taught us the necessity of greater care in the original construction of Canals, and the importance of many improvements, which may be considered as appendages of the main work. It is also proven, that these additional structures can be much more cheaply made, while the main work is in progress, than afterwards. This plan of operations has therefore been adopted. Much of the expense which has been found necessary, in order to give to those divisions of the Canal which were first finished the requisite degree of security and usefulness, will, by these means, be hereafter avoided; and although the first cost of the Canal will be somewhat increased, the subsequent expenditures required to superintend and keep it in repair, will be greatly diminished. Still, however, some expense must unavoidably be incurred, in order to render a Canal secure and permanent after it is taken off from the hands of the contractors, and is in a state of readiness to receive the water.

The Board have the pleasure of stating, that the locks, aqueducts and other important structures on the Canal, have so far, fully answered the purposes for which they were designed, and that no serious injury has been sustained by any of them since their completion.

Our former calculations in relation to the supply of water on different parts of the line, have, so far as we are now able to determine, generally proved correct. In some instances, however, it has been deemed expedient to introduce feeders at shorter distances from each other, than was at first considered necessary. Serious inconveniences frequently occur, where a great length of Canal is supplied from one source; particularly where the locks are frequent, and the levels short. The Canal is fortunately, however, so located that an additional supply of water, to that now believed to be necessary, may be thrown into almost every part of it, at a moderate expense.

Owing to circumstances entirely temporary and accidental, the water in the Portage Summit level, at one time, was suffered to become rather too low for convenient navigation. When this fact was discovered, means were taken to prevent the great and unnecessary waste of water by which it was occasioned, and the level was in a few days entirely replenished, although it embraces between three and four hundred acres of natural reservoir, over the whole surface of which the water necessarily had to be raised. This circumstance occurred in the driest part of the last season, at a time when the streams which supply the summit, were as low as they have been at any time for several seasons. It is mentioned merely to show the abundance of the supply, and to allay any fears which unfounded rumors may have awakened.

The increase of transportation on the Canal, from the interior to the Lake, has not been as great as under other circumstances might have been reasonably anticipated. This may be mainly attributed to the lightness of the wheat crop which was harvested the previous year. Although the crops of the last season were very abundant, but little wheat was floured for exportation until it was too late for it to reach the New York market. The uncommon drought which prevailed during the latter part of the season, and the sudden and great reduction in the price of flour, may be assigned as the principal causes of this failure; the latter diminishing the inducement, and the former in-

creasing the difficulty of preparing this principal staple of the country for exportation.

The returns of the Collector of Canal tolls at Cleaveland, evince a great increase of transportation from the Lake southwardly, during the past, over the preceding year. The amount of tolls collected at that office during the year 1829, being \$4,597 39; and for the year 1828, only \$2,351 48. No returns having been received from the Collector at Akron for the last month, nor from the Collector at Massillon for the two last months; the total amount of tolls collected on that portion of the Ohio Canal which has been navigable during the past season, cannot be accurately stated: it is believed, however, to exceed \$7,000 00. The amount of mineral coal transported on the Canal, is increasing annually with great rapidity, and had efficient arrangements been made for supplying the demand, the increase would have been vastly greater than it has been.

Believing that the employment of the principal Engineer was no longer required by the public interest, the Board made arrangements at the last meeting, to dispense with the further services of David S. Bates, Esquire, in that capacity. This arrangement took effect on the last day of February, 1829. Since that time no Engineer of higher grade than resident Engineer has been in the employment of the Board.

There has been paid to contractors and superintendents on the Miami Canal, within the year ending on the 30th of November, fourteen thousand one hundred and fifty one dollars and twenty eight cents, as follows, to wit:

Balances due contractors, as stated in the last annual Report of the Board, with additional sums found to be payable on a closer examination of the then unsettled accounts,	\$2,066 45
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In the construction of lock houses,	750 00
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For additional work in strengthening and securing the banks, dam, head gates, waste weirs, &c. and for repairs,	10,323 59
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For the construction of an additional culvert made necessary to avoid a heavy deposit in the Canal, and consequent change of line,	1,011 24
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The sum paid up to December 1, 1828, is,	14,151 28
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	745,515 20
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Total expenditure in construction, improvements and repairs, to December 1, 1829,	\$759,666 48
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Navigation has been successfully maintained throughout the season on this Canal, with the exception of the interruptions caused by two successive failures in one of the heavy embankments on Mill creek, by which it was suspended in the aggregate considerably upwards of a month.

The tolls which have been received on this Canal within the year ending on the 31st of December, amount to the sum of \$20,941 36.

Contracts have been made for the extension of this Canal from the head of Main-street in the city of Cincinnati, to the termination of the level at the head of Broadway, and for the construction of a section crossing the immediate valley of Deer-creek. It is proposed to put the remainder of the line to the river under contract in the ensuing spring.

A lot of ground of one and a half acres, situated on the Feeder at Dayton; and also, a lot of one acre, situated at the third lock below that place, have been purchased as sites for the application of the surplus water of the Canal to hydraulic purposes.

John Satterthwaite, Esq. of Warren county, has been appointed by the Acting Commissioner, to fill the vacancy in the Board of Appraisers on the Miami Canal, occasioned by the death of Matthias Corwin, Esq. A further assessment of damages has been made by this Board to the amount of three hundred and eighty eight dollars, as will be shown by the accompanying schedule.

John Saxton and Orlando Metcalfe, Esquires, of Canton, and Edward Avery, Esq. of Wooster, have been appointed Appraisers of damages on that division of the Ohio Canal which extends from the Portage Summit to Caldersburgh; and damages have been assessed by them to the amount of \$455, as exhibited in a schedule accompanying this report. Further damages have also been assessed on that division extending from Caldersburgh to the Licking Summit, by the Appraisers heretofore appointed, to the amount of \$1,066 00, a schedule of which is also annexed.

The Board have not as yet acted on the resolutions of the General Assembly, of the 9th of February, 1829, relative to the claim of the estate of Hiram Johnson, deceased.

The first of these resolutions instructs "the Board of Canal Commissioners" to cause a certain sum therein named, to be paid out of the Canal Fund, to the Administrator on said estate. The second instructs "said Commissioners" to cause an estimate of the expense and labor of constructing section number one, of the Ohio Canal, at a fair and reasonable price, to be made by the Principal Engineer, and one or more of his assistants, so far as the same was finished by said Johnson; and that they cause such estimate to be paid to said Johnson's estate from the Canal Fund, as soon thereafter as convenience will permit, subject to a deduction of such amounts as have already been paid.

The Board of Commissioners had adjourned previous to the passage of these resolutions, and had left Columbus for their respective homes. They were not apprised that the claim would be brought before the General Assembly, previous to the adjournment; and no meeting, until the present, has been held since the passage of the resolutions.

As the resolutions instruct the "Board of Canal Commissioners," to perform certain acts, and invest them as a body with certain discretionary powers, the Acting Commissioner did not consider himself authorized to proceed in the case without the direction of the Board.

Wherever it is intended that the Acting Commissioner alone shall perform certain duties, or exercise discretionary powers, not previously delegated by the Board, it is believed to be the practice of the General Assembly to invest the Acting Commissioner expressly with the necessary authority. The authority given him to alter the location of roads in certain cases, and to appoint appraisers of damages, are instances of this practice.

It will be seen by reference to the act "to provide for the Internal Improvement of the State of Ohio by navigable Canals," (Sec. 4,) that the Commissioners of the Canal Fund have by law the control of the moneys provided for the purpose of constructing the Canals, and are invested with authority to establish such rules as they may deem necessary and proper to secure the faithful application of the Funds. No provisions had been made in the regulations established by the Commissioners of the Canal Fund, under this statute, for the payment of money to contractors, in cases similar to the one under consideration. Under these circumstances, it was believed that the call of a special meeting of the Board, which would have been attended with considerable inconvenience and expense, would not expedite the final liquidation of the claim, without the concurrent act of the Commissioners of the Canal Fund.

Since their present meeting, the Board have declined acting on this case, understanding that the General Assembly have the claim again under consideration—and from a conviction that a full statement of the facts was not laid before the last General Assembly at the time of the passage of the resolutions. Under these circumstances, the Board believe it to be their duty to wait until the final determination of the General Assembly in relation to the subject, shall be made known.

It is found, on examination, that the amount of lockage required to connect the Canal with the Muskingum river, opposite to the town of Coshocton, as proposed in the resolution of the last General Assembly, is greater than was supposed, being upwards of twenty feet. Two locks will be required to effect this junction; and a low dam across the river will also be required to render the connexion useful to the town of Coshocton.

Should the proposed improvement be adopted, the passage of Canal boats from these locks to the opposite shore, adjacent to the town, will at times be attended with some difficulties and risk, rendering it doubtful whether the extent to which it will be used will justify the necessary expenditure.

It seems desirable to afford to Coshocton, and the adjacent country on the east side of the Muskingum, more convenient means of access to the Canal, than now exists: and the encouragement given by the resolutions of former General Assemblies, may afford some claim to this accommodation.

It appears now to be the better opinion among those interested, that access to the Canal by means of a bridge will be more desirable and convenient, as well as less expensive, than by the method heretofore proposed; and if the General Assembly deem it proper to devote any portion of the public funds to the object in view, it will probably be more beneficial to aid in the erection of a bridge, than to construct the side cut and locks.

In obedience to the resolution of the last General Assembly, directing the Canal Commissioners "to cause a proper examination to be made in order to ascertain the most eligible manner of connecting the town of Piketon, by a navigable communication with the Ohio Canal;" a survey and examination have been made, and a plan determined upon which is deemed the most eligible to effect the objects of the resolution.

By the erection of a dam across the Scioto river, near the mouth of Pee Pee creek, of five feet in height, and the construction of a lock of 12 20-100 feet lift, which shall serve the double purpose of a lift lock and a guard lock, with a guard bank extending from the Canal to the west abutment of the dam, a navigable communication may be had to the town, using the river from the point of intersection near the mouth of the creek.

The expense of constructing the works proposed by this outline is estimated at, \$23,875 00.

The Board deem it their duty again to invite the attention of the General Assembly, to the importance of improving the navigation of the Muskingum river between Zanesville and the junction of the Muskingum Side cut with the river at Dresden. The small comparative expense of opening a complete water communication between the Canal and the flourishing town of Zanesville, one of the most important manufacturing towns in the State, seems to indicate this as a part of the system of internal navigation already adopted, and necessary to ensure the full enjoyment of the benefits and revenues contemplated from the great work in which we are engaged.

A modification of the law relative to the sale of hydraulic power, created by the Canals, Feeders and dams, is believed to be important, and the attention of the General Assembly is again respectfully asked to that subject. It is found on experiment, that many persons who wish to purchase and improve these privileges, decline purchasing on a lease for a limited term of years;

and it is believed that while more advantageous terms for the State may be obtained on a permanent lease or absolute sale, it will prove important on another account. The mills, manufactories and other improvements by which the water power is to be used, will be of a more extensive, useful and permanent character, and will consequently add more to the business and revenue of the Canals, as well as increase in a great degree the prosperity of the surrounding country.

Numerous applications for relief have been made to the Board as well as to the Acting Commissioners, by contractors in cases where it is alledged that losses have been sustained by them in the performance of their contracts.— These alledged losses are ascribed principally to the following causes. To the work proving to be more difficult and expensive than was anticipated by the contractor at the time of making his proposal: To the occurrence of floods, rainy seasons, or other unforeseen events: To an unexpected increase in the price of labor and provisions: To changes in the plan of the work, or in the location of the Canal.

In order to ascertain the legislative will in relation to the principles, by which these various cases are to be decided, that the Board may be enabled to act in accordance with that will, it is deemed proper to lay before the General Assembly, the rules by which the Board has heretofore been governed, in the management of the work, committed to their charge, and in deciding on the relative rights of the State and individual contractors, the reasons which have induced their adoption, the objections to a departure from these rules, and the probable consequences of such a departure.

Written contracts are entered into, in all cases, by the parties; and the stipulations of these contracts are considered as governing the decision of all cases which may arise in the performance of work under them, so far as those stipulations extend.

Contractors have been notified of this rule previous to making their proposals: They have been particularly cautioned to examine carefully the character of the work which they are about to undertake, in order to ascertain its true value, and to fix with caution, the prices for which they propose to perform it; and they have been distinctly notified that no greater prices will, in any event, be paid, than those stipulated in the contract.

They have been further informed, that all parts of the work contracted for, will be considered as being at their risk, until the completion and acceptance of the whole job; and that no part of it will be accepted and taken off from their hands until the whole shall be finished.

Under an adherence to these rules, hard cases will undoubtedly occur; and such have already occurred. But it is nevertheless believed that a material departure from them, will produce still greater evils.

Notwithstanding all the cautions that can possibly be given, and all the light that can be thrown on the subject, experience daily proves, that some men will judge erroneously of the value of work; some will form incorrect estimates of their own skill and ability to perform it, and will consequently undertake jobs, at rates, which will subject them to inevitable loss. Still these very men will complain loudly of partiality and injustice, if they are refused contracts at these reduced prices.

Experience, also, proves that one man will make a fair profit on a job of the same character and taken at the same prices, which would subject another of less industry, economy or skill, to a serious loss. The same difference is observable in the private concerns of different individuals, and extends itself throughout all the various pursuits in which men engage.

It is impossible even for the agents of the State, who are constantly employed in the immediate superintendence of work on the Canals, to arrive at a

satisfactory conclusion in every case, where a loss has been sustained, whether that loss has resulted from an error in judgment as to the value of the work before it was undertaken, or from the want of skill, industry and vigilance, in its management. Should such a discrimination be attempted, it would be utterly impossible to satisfy the public or the persons interested of the justice and impartiality of the decisions which should be made, however correct in point of fact; and it is of vital importance to the usefulness, and even to the existence of any tribunal in our country, that a reasonable degree of confidence be felt in the correctness of its decisions.

If then the stipulations of the contracts be departed from, there seems to be no other alternative, than to extend relief to all those who assert that they have sustained losses on their contracts, and who cannot be proved guilty of gross negligence or mismanagement.

The first objection which presents itself to this course, is the difficulty of ascertaining, whether any loss has actually been sustained in the prosecution of work on the Canals, and if any, what is the amount of that loss. Many have taken contracts on the Canals, who were more or less involved in debt: Some have appropriated money received on their contracts to the discharge of previous liabilities, or to other purposes not connected with their jobs; and for the want of this money, their operations on the Canal have become embarrassed: Some have kept their accounts in such a manner that their disbursements on their Canal contracts cannot be separated from their other expenditures: In few instances, perhaps, can entire reliance be placed on a statement of accounts, furnished by a party feeling a deep pecuniary interest in the effect to be produced by such statement.

But supposing it possible to devise some method to obviate this objection, and that remuneration beyond the contract prices be made to the industrious and honest contractor, who has actually sustained a loss on his work; shall not a similar advance be given to him who has performed work of the same character at the same prices, and who nevertheless has made a handsome profit on his job by means of his superior skill and economy? Justice seems to require it; for every man has an undoubted right to the product of his experience, vigilance and skill? Shall an additional price then be given to him who has made, as well as to him who has lost money on his contract?

These embarrassing considerations, which form a serious objection to a departure from the course heretofore pursued, are not the creatures of fancy: numerous cases of the kind supposed actually exist, as can be made apparent to any intelligent and unprejudiced mind.—These consequences of a departure from the stipulations of the contract, have been actually experienced in a sister State, which set the first great example of making Canals at the public expense.

It may be urged that contracts should only be given to those whose industry and skill will enable them to manage the work in the most economical manner:—An individual in the management of his own concerns, may safely adopt this rule: He may select the person whom he will employ, and refuse employment to others: He is not under the necessity of assigning any reason for the preference; for having an undoubted right to consult his own inclination as to the persons to be employed in his own business, no one has any authority to call him to an account for any supposed partiality. But a public agent is far differently situated. He must be governed by general rules, and be able to assign reasons for his conduct, which are satisfactory to others. He is therefore liable to the imputation of partiality and favoritism if he refuse to give contracts to those, who according to the general rules, are entitled by their proposals to a preference; and is under the necessity of assigning jobs to those, who in his opinion are not the best qualified to manage them.

because he has no evidence by which to convince the public of their unfitness.

Where works on the Canals have sustained damage in their unfinished state, from the concurrence of floods in adjacent streams, it has not been the practice to throw the loss on the contractor, unless the damage has resulted from his neglect or mismanagement. If the work has been performed in due season, and faithfully executed, agreeably to the instructions and advice of the Commissioner or Engineer having charge of the line, the contractor has, in that case, been paid for the work done previous to the occurrence of the injury, and also, for the replacing that which has been destroyed. But if the contractor has refused to obey the instructions, or to conform to the advice given by the Commissioner or Engineer in relation to the securing of his work, or has so unreasonably delayed its completion as to leave it unnecessarily exposed to the effects of high water; it has been deemed just and equitable that the loss should fall on him. The adoption of a different rule would destroy all inducement on the part of the contractor to render his work secure; and leave the State to sustain heavy losses from his mismanagement or neglect, the prevention of which would thus be put out of the power of its agents.

Where the expense of executing work has been enhanced in consequence of the increased price of labor and provisions, it has been deemed improper to interfere, to relieve the contractor. An increase in the price of labor, provisions and forage, by putting in requisition an unusual amount for the prosecution of any important work, is an event to be expected. Such a state of things ought therefore to be anticipated by the contractor, and in most instances, it probably is anticipated at the time of making his proposal. In these cases there can be no rule by which to determine what increase of prices may be fairly expected; and consequently no criterion for ascertaining whether the actual increase has or has not exceeded those reasonable expectations.

To depart from the stipulations of the contract in these cases, would be in effect to acknowledge the justness of a claim on the part of the contractor to an additional allowance in almost every instance, and leave no rule by which to determine the ratio of increase.

The same remarks will apply to losses sustained in consequence of unfavorable seasons.

It is obvious that seasons are perpetually varying from each other, some being more, and some less favorable than the average. No satisfactory rule can therefore be adopted for granting relief in such cases, and any attempt to do so, would result in authorizing an indefinite allowance on almost all contracts that have been made, whether they may have proved profitable to the contractor or otherwise.

Where important changes are made in the location of the Canal, or in the plan of construction, so as materially to change the specific value of the work, after the contract has been entered into, the contractor is at liberty to relinquish his job, and receive pay for what he may have done previous to the change at the contract prices, or to make a new agreement with the Acting Commissioner as to the price to be paid for the work affected by such change. In several instances, amicable agreements between the contractor and the Commissioner have been made. But where no complaint is made by the contractor at the time of making the change, and he proceeds with his work without claiming any additional allowance, it is considered as an acquiescence on his part, as to the alteration, and the specific prices stipulated in the contract are allowed to govern.

Of this rule, contractors have been duly notified, at the time of bidding, and no cause of complaint is therefore given by its observance. On the other

hand, this rule has been considered necessary in order to avoid unpleasant disputes between the parties, after the performance of the work, and claims for damages and extra prices to an indefinite extent on the part of the contractor, even when the change has actually been beneficial, rather than injurious.

The difficulty, not to say impossibility, of discriminating between the various cases in which relief is sought, so as not to squander the public funds on the one hand, nor on the other to exclude all meritorious cases of hardship from the relief proposed, is a consideration entitled to much weight in determining on the expediency of departing from the rules of the contract.

Every allowance to a contractor over and above his contract prices, except in cases where the character of the work is changed, and new directions given after contracting, must be considered as a gratuity.—If the State has not the right to claim a reduction of prices where the work proves more profitable than was anticipated, it is clear that the contractor has no right to claim an increase where it proves less so.

An individual in the management of his own affairs, may safely make such gratuitous allowances, where he may believe justice requires it; because he has the right of withholding the gratuity in other cases without any liability to be called to account for making the distinction. But public agents must be able to show that their distinctions are well taken, and their discretion impartially exercised, especially in the gratuitous disbursement of public money between different persons.

The rules upon which the Board have deemed it advisable to proceed in their dealing with contractors, and in the management of the work committed to their care, were laid before the General Assembly in their first annual report after its commencement.*

These rules having received at least the tacit approbation of the General Assembly, and the express sanction of their committees, the Board have not felt themselves at liberty to depart from them without the direction of the Legislature. The system was adopted on the advice of persons of great sagacity and experience in the management of public works, from a thorough conviction of its importance to the prosperity of the undertaking, and to the credit of the State, and any material departure from the course heretofore pursued, it is feared, will have a great tendency to injure both.

The State of New York, after having adopted, and for several years practiced upon the principle of making allowances to contractors over and above the contract prices, where losses were alledged to have been sustained, found the consequence of the system so pernicious as to induce the Legislature to prohibit by law, the Commissioners from paying greater prices than those contained in the written contracts, in any case whatever. By the laws of that State, the Canal Board, which is understood to consist of the Canal Commissioners, and Commissioners of the Canal Fund, is alone authorized to make such extra allowances, and the cases in which they are authorized to depart from the terms of the contract, are limited to those in which new directions have been given to the contractor after the making of the contract, and to those in which the work proves to be of a different character or description from that contemplated by the Commissioner or Engineer. All allowances which result from, or include losses to the contractor, from the unfavorable terms of his contract, are expressly prohibited.†

If the State of New York found it necessary to prohibit a practice which was likely to embarrass even her extensive resources, it is certainly prudent

*Kilbourn's Canal Documents, pages 188-189.

†New York Revised Law, 9th title, 2d article, sec. 37, page 97.

do do same title, 4th article, sec. 76 and 77, page 105.

for us to pause before we adopt the course which that great State found it necessary to abandon.

Were the increase of expense to the State the only evil attending a departure from the terms of the written contract, the objections to that course would be greatly diminished both in number and weight.

Whenever the estimated value of the work, and not the price fixed in the contract, is to govern, bids will be made without examination or care, and the contract will be reduced to a mere nullity: Every artifice will be resorted to, to conceal the real, and to enhance the apparent cost of the work: and those who are too honest and high minded, to descend to these arts, dishonorable in themselves and demoralizing in their influence on society, will in practice be driven from a fair competition with those whose sense of moral integrity and honor is of a more flexible character. Such a principle introduced into the management of great public works, operates in practice as a premium on dishonorable artifice, and excludes honest men from participating in its execution: making fortunes for the least deserving, at the expense of the more honest and industrious citizen. By the adoption of such a course, contractors will feel themselves in a great measure released from the obligations of their own agreements, and in effect, rendered independent of the agents of the State, even in relation to the manner of executing their work. For in some instances truth compels us to state that the power of withholding their pay is the only hold we have upon their fidelity in the performance of this part of their duty.

There are undoubtedly a few cases in which it would be desirable to grant relief to contractors, provided it could be done without opening a door for fraud and imposition on the public. These are cases where, from peculiar circumstances, the true value of the work cannot be ascertained before hand; and where both the Engineer and contractor, are disappointed as to its character.

The only difficulty in these cases, is to determine the particular instances in which such claims shall be allowed, so that relief may be granted in cases where justice requires it, without encouraging applications and making allowances, where as great a portion of the work has proved better than was expected, as that which has proved worse.

When the disappointment in the character of the work has resulted from the want of sufficient examination and care on the part of the contractor, and it has been in his power to determine its true value by the use of sufficient vigilance, it would be dangerous to grant relief. Such a course would only encourage negligent examinations and careless bidding and greatly increase the number of improper claims.

But in all these cases where it is proposed to grant relief, by a departure from the terms of the contract, it must be obvious that the benefits resulting to the parties will not be reciprocal. The State will be called upon to make up the losses, where the work has proved more expensive than was anticipated, while no contractor will be willing to give up any portion of his profits where it has proved less so.

That a sovereign State should not screen herself from the payment of just and legal claims in consequence of her exemption from liability to be sued, and thereby deprive the contractor of rights, which he could enforce in courts of law or equity, is a proposition too clear to admit of dispute. The Board are not aware of the existence of any such cases. It has been the uniform practice of the Board, to extend relief and allow the claims of contractors in all cases where it was believed that redress could be obtained in a court of law or equity, had the contract subsisted between individuals. Nevertheless, it is possible that among the numerous cases which have, from necessity, been

decided in a hasty manner, by the Acting Commissioners, without the advantage of being able to procure full testimony as to the facts, instances may have occurred, in which legal or equitable claims on the State, have not been allowed, owing to a misapprehension, as to the facts, or to an erroneous application of the principles of law and equity to those facts.

All of which is respectfully submitted,

ISAAC MINOR,
BEN. TAPPAN,
N. BEASLEY,
JOHN JOHNSTON,
A. BOURNE,
ALFRED KELLEY,
M. T. WILLIAMS.

COLUMBUS, Jan. 9, 1830.



SCHEDULE of awards for damages done individuals, in the construction of the Ohio Canal, between Caldersburgh and the Licking Summit, made by the Board of Appraisers, on the 13th Nov. 1829.

<i>In whose favor.</i>	<i>On what account.</i>	<i>D. C.</i>
William Watson	Injury to his farm	\$250 00
Joseph Harris	do	50 00
Andrew and James Mills	do	100 00
Mathias Miller	do	150 00
Susanna Pratt	do	50 00
John Gray	do	250 00
George Oglesvie	do	125 00
Dennes Hurley	Injury to his field and crop	16 00
Eli Whitaker	Stone taken from quarry	75 00
TOTAL,		\$1,966 00

SCHEDULE of further awards for damages sustained by individuals in the construction of the Miami Canal, made by the Board of Appraisers, on the 16th and 18th days of December, 1829.

<i>In whose favor.</i>	<i>On what account.</i>	<i>D.</i>	<i>C.</i>
Egbert T. Smith	For injuries to his farm, dwelling house, garden, water pipes, &c.	\$200	00
Heirs Daniel C. Cooper	Timber taken from their land	52	50
Henry Bacon	do	25	50
Daniel Dotey	do	30	00
Nathaniel Woodward	Injury to his land	40	00
Christian Kohr	do	40	00
TOTAL,		\$388	00

SCHEDULE of awards for damages to individuals in the construction of the Ohio Canal between the Portage Summit and Caldersburgh; made by the Board of Appraisers on the 3d December, 1829.

<i>In whose favor.</i>	<i>On whose account.</i>	<i>Items.</i>	<i>D.</i>	<i>C.</i>
William Brown	Injury to his farm	15	00	
John Brown	do	20	00	
Henry Alleshouse	do and for timber used	50	00	
John Uhrick	do	20	00	
John Demuth	do	25	00	
Samuel Romig	do	25	00	
Godfrey Westhoeffer	do	50	00	
James Abraham	do	35	00	
Moses H. Stringer	do	15	00	
John Hilton	do	20	00	
Moses H. Stringer	Destruction of a mill seat	25	00	
Heirs of Henry Miller	Injury to their farm	30	00	
Thomas H. and John Miller	do and mill site	125	00	455 00

To the Hon. Speaker of the Senate:

SIR—

The Board herewith transmit a report on the claim of the administrator of Hiram Johnson, with sundry documents referred to in that report; which they request you to lay before the Senate, in compliance with the resolution of that body on the subject.

Very respectfully,

BENJ. TAPPAN.

President, pro tem.

January 13, 1830.

To the Board of Canal Commissioners:

I have the honor of submitting the following statement in the case of the claim of Hiram Johnson, deceased, which comprises all the material facts in that case, so far as the same are within my knowledge or recollection:

About the middle of January, 1826, proposals were received at Kendall, for the construction of the Canal from Portage Summit Lake, to Massillon, which included the contract in question. Printed notices, in the form of handbills, were put up, and also distributed among those who attended the letting, stating at length, the rules which the Board had adopted, in relation to the work on the Canals, so far as contractors were concerned.

In these notices, contractors were cautioned to examine the work carefully, and fix the prices at which they proposed to undertake the work on their own judgment and responsibility; for that no greater prices, would in any event, be paid for work, than those specified in the contracts.

The competition at this letting was very great, and a considerable number of bids were received, from persons who were considered abundantly responsible, for the sections which were assigned to Johnson and others. One proposal, I recollect distinctly, was received from a company, who stood very high in my estimation, both as to integrity and responsibility, for Section No. 1, at the same price for excavation, of which the work on the Section was chiefly composed, as that of Hiram Johnson and others. There was a trifling difference on the price of grubbing, in favor of the bid of Johnson and others, which entitled their proposal to the preference.

Mr Johnson, who attended the letting, expressed uncommon solicitude to obtain the section. He stated that one of the persons concerned with him in making the proposal, (Mr Pratt, if I mistake not,) had performed or superintended the work on a similar job, on the Erie Canal, in New York; and was a good judge of the value of such work, and well acquainted with its management.

It was understood at the time of the letting, that the excavation consisted mostly of peat or muck, with some sand, clay and gravel, at the bottom, particularly near the middle and between the middle and north end of the Section. Although pits could not easily be dug to bottom, on account of the water in the swamp, yet the depth of the muck, and the character of the harder earth at the bottom, was ascertained by running down poles or rods, which any person could do who chose to make the experiment.

At the time of the letting, bidders were informed that Rossiter & Barclays, contractors for Section No. 1, north of the Summit Lake, were bound by their contract to have so far finished their job, as to draw down the water in that Lake near to the level of the bottom of Canal, in the month of December previous, 1825. That they had not complied with this part of their agreement, but that the work was so far advanced, as probably to enable them

to draw down the water in the Lake early in the ensuing season. In the month of April or May, I think was the time mentioned.

Mr Johnson, whose place of residence was in Middlebury, within about two miles of the job of Rosseter & Barclays, knew the situation of that job, and could perhaps judge as well as the Commissioner, of the probable time of its completion.

The remaining part of the winter and early part of the ensuing spring, proved rather unfavorable to the prosecution of the work; and it was found difficult to draw off the water from the Lake through a narrow ditch, which was at first proposed and attempted, on account of the sandy nature of the earth, which would cave in at the sides, and fill up the bottom of the ditch.

In consequence of these difficulties, the job of Rosseter & Barclays was not finished so as to draw off the water from the Lake, until the month of September, 1826.

The contract for Sections No. 1 & 8, south of the Summit, is dated 13th February, 1826. The contractors were Hiram Johnson, Sheldon Chapin, Lyman Chapin, Jared L. Rathbone, John Pratt, James Simpson and Benjamin Sayer. Mr Johnson I considered the managing or acting partner.

The contract contains no stipulations as to the drawing off of the water from the Summit Lake. It is, however, admitted, that the contractors had a right to expect that it would be done in the spring of 1826. Every reasonable exertion was made to accomplish this object on my part; and Mr Johnson, I think, had permission to put a force on Section one, north of the Lake, so as to expedite the work, which he at one time proposed to do, and to be paid for the work he should do on that Section. This, however, was not done.

Previous to the time that the job of Rosseter & Barclays was finished, and about the time of its completion, Mr Johnson claimed that he had sustained damage in consequence of the water's not being drawn off from the Summit Lake, agreeably to the terms of their contract, and his expectations. I proposed to the parties to settle the amount between themselves, by arbitration or otherwise, as the damages which Mr Johnson & Co., had a right to demand of the State, Rosseter & Barclays would be liable to pay to the State. To this proposal, one of the parties, I do not now recollect which, assented, but the other declined; and no such settlement was made to my knowledge.

On my settlement with Rosseter & Barclays, I retained the sum of five hundred dollars, on account of the damage to which I considered the State liable, in consequence of their unreasonable delay in the prosecution of their work. I did not consider this sum sufficient to pay the damage which Johnson & others had sustained in consequence of not being able to drain the water from their job into the Summit Lake, as soon as they had a right to expect. The retaining of a greater sum, would, as I feared, render them unable to pay their laborers, or a greater amount would have been retained.

It has been stated in some affidavits that were presented to the Board, and probably to the last General Assembly, that the water was kept back in the Lake, after the completion of Rosseter & Barclay's Section, in order to serve as a reservoir, and afford a larger and more uniform supply to the mill employed in the grinding of water lime; and, as the deponents suppose, further damage was sustained by Johnson and others, in consequence thereof.

This conclusion, I am confident, is erroneous. I distinctly recollect to have consulted Mr Johnson on this subject, and to have asked him whether he would sustain any damage by such an arrangement. He replied that he had no objection to it, as he could not put men on that part of his job which was affected by the water in the Lake, at that season of the year, on account of the apprehension of sickness. The water was, however, retained in the Lake for the use of the mill but a few days: for on attempting to move a plank in a

temporary dam erected across the Canal near the Lake, so as to increase the quantity flowing to the mill, the whole dam was undermined and gave way, and the Lake was suddenly drawn down as low as the Canal would drain it. This circumstance is mentioned in the annual Report of the Board of the succeeding winter.

The time stipulated in the contract of Hiram Johnson and others, for the completion of their work, expired on the first day of July, 1827.

In the month of July or August, 1827, Mr Johnson expressed himself unwilling further to prosecute the work on Section No. 1, until he had ascertained what sum he was to be allowed on account of the damages which had been sustained in consequence of the water's not being drawn down in the Summit Lake, as soon as he had a right to expect. Finding that we could not agree as to the amount of the damages which they had sustained on this account, he proposed to relinquish Section No. 1; and to go on with Section No. 3. To this proposal, I assented, from a consideration of the peculiar circumstances of the case, though an unusual course to suffer a contractor to abandon part of the work specified in a contract, and go on with the remainder. He demanded, however, the whole amount of per centage, as it is commonly called; being the sum or proportion retained on each estimate to insure the completion of the work. To this I objected; for I considered and I now believe, that the sum he had already been paid, was more than the fair value of the work done. The work, which at the time had been performed on Section No. 1, was far less expensive in proportion to the number of cubic yards removed, than the average of the work. It consisted mostly of earth excavated from the surface of the Section, to the depth of from 3 to 7 feet, or thereabout, and left the remainder to be excavated in the bottom of the Canal, much of which was from 10 to 12 feet cutting. Only three fourths of a cent on the cubic yard was retained by the Engineer on account of this difference, as well as I recollect; and the real difference was, as I believe, at least 2 1-2 or 3 cents, between that part then excavated and that which remained to be done. I am confident that the last foot of excavation in the bottom, cost at least four times as much as the average cost of the excavation above it.

Had the contractors then relinquished Section No. 1, as they then had the option of doing, their claim to remuneration for any damages previously sustained from the omission to draw down the water in the Lake, would not, I believe, have been affected.

Not being able to effect an arrangement between ourselves, I proposed to submit the question of damages to William H. Price, Resident Engineer, who was acquainted with all the material facts necessary, to a correct decision.—To this, Mr Johnson objected, and proposed Judge Bates, as the umpire; to this proposition I agreed.

Judge Bates soon after arrived from a journey to the State of New York; and being informed of the submission, but not precisely of the terms, went on to examine the case and make an award. I was at this time, absent on the southern part of my line, and his decision was made previous to my return.

In making this award, Judge Bates did not confine himself to the damages sustained in consequence of the failure to draw down the water in the Lake by the time expected, but took into consideration the unfavorable character of some parts of the work, and the probable expense of performing it; which he was not authorized by the submission, to do.

The award of Judge Bates, was in substance, that the sum of five thousand dollars, over and above the contract prices, should be paid to the contractors, on the completion of the job, on account of the failure to draw down the water in the Lake by the time expected, when the contract was made, upon condition the job should be completed, by the time the Acting Commissioner

should deem necessary, to the interests of the State, and should fix upon; and that this sum should cover all claims on account of the rising up of the earth in the Canal, by the sinking of the banks.

This award I have not now in my possession at this place. It is, I presume, among some of my files of papers, either at Cleaveland or at Akron. The material parts of it, however, I distinctly recollect, and according to that recollection, they are here correctly stated.

Soon after receiving this award, I called on Mr Johnson and informed him of its substance, and stated to him that although Judge Bates had gone beyond the terms of submission, I would nevertheless pay him the five thousand dollars awarded, provided he would complete the job in the month of April, then next, 1828, (the precise day I cannot with confidence, state,) as I deemed it very important to the interests of the State, to have the navigation opened across the Summit, with as little delay as possible.

He was then distinctly informed that the sum awarded, would not be paid until the job was finished; and that his receiving it, must depend on his completing the job by the time fixed upon.

Mr Johnson at first hesitated as to prosecuting the work on those conditions; but said he would go on and make every exertion to complete the work by the time. To this proposal I objected, on account of its being too indefinite, and not susceptible of being brought to a test. He might assert that he had done every thing in his power to accomplish the work by the time, and I might think otherwise. I still gave him the option of relinquishing Section No. 1, and keeping Section No. 8, or of accepting the sum fixed in the award, on the terms proposed, and going on with the work. He demanded a day or two for consideration, which was acceded to on my part, and at the end of the time he informed me that he had made up his mind to go on with the work.

By this agreement, founded on the award of Judge Bates, I considered all questions between the State and the contractors, on account of damages in consequence of the failure to draw down the water in the Lake by the time anticipated, and as to the extension of time which should be allowed them on that account, and also on account of any claim they might have in consequence of the rising of the muck in the bottom of the Canal, to be settled. Mr Johnson also viewed the agreement in the same light, as far as I know and believe, and so far as I can judge from his subsequent statements and acknowledgments.

Arrangements were not made to commence the work as early and as vigorously in the fall as I considered necessary; and feeling very anxious for the early completion of the work, I called on Mr Johnson, expressing my fears that he was delaying the commencement of the work too long, and that he would not be able to finish the job by the time agreed upon, unless more vigorous exertions were made, and notified him that he must not expect an extension of the time.

The latter part of the fall and the succeeding winter proved very unfavorable for the prosecution of the work on Section No. 1, or the swamp job, so called, on account of the unusual quantity of rain which fell during those seasons.

About the first of February, 1828, as near as I now recollect, Mr Johnson proposed to me to change the location of part of the Canal line near the middle of the Section, so as to avoid that part of it where he experienced most difficulty on account of the rising of the muck in the Canal. He urged as a reason to induce me to make this change, that it would enable him to finish the Section much sooner than he otherwise could do, as the old line, from which the top of the earth was taken off to the depth of 4 or 5 feet, would

serve to drain off the principal part of the water, and he would have drier as well as more firm ground to work upon. The Canal would also be made a little shorter by the proposed change.

Wishing to hasten the completion of the work, as well as to aid the contractors in the completion of their work in season to entitle them to the sum awarded by Judge Bates, I directed an estimate to be made of the additional cost. This was done; and notwithstanding the change would increase the cost to the State, from 1300 to 1500 dollars, as then estimated, I consented to have it made, at the *urgent solicitation* of Mr Johnson.

I have since learned, that Mr Johnson had other motives in inducing me to agree to the change of line, besides those disclosed to me. That he expected it would give him a claim to a further extension of the time for completing the work, and also serve as the foundation of a claim to an additional allowance over and above the contract prices, on account of the alteration of the line and the increase of the amount of work. These motives he had not the candor to avow, at the time of urging the change.

It now appears that this change of the line cost the State much more than was expected. I am informed that this difference between the estimate made at the time of the change and the actual cost of the new line over the old, is owing to the fact, that in making the comparative estimate, the earth which had risen up in the bottom of the Canal was measured, and this the contractors would have been bound to remove without additional pay, had the location on the old rout been continued, as it formed part of the consideration for which the sum of five thousand dollars was awarded by Judge Bates.

This change of the line was unquestionably advantageous to the contractors. They had been paid for the excavation done on the old line, which consisted in taking off the surface of the earth, to the depth of from 4 to 6 feet, and also for all the excavation done on the new line, at contract prices. They also had the advantage of better ground, and of the drain formed by the excavation on the old line. They were also released from the obligation of again excavating the earth which had risen up in the bottom of the Canal on the old line, which by the award of Judge Bates, and the agreement founded on that award, they were bound to excavate without its being again estimated. I was much surprised when this was made a ground for an extra allowance over the contract prices in the memorial presented to the Board last winter, as I had not then learned that this was among the motives which induced Mr Johnson to urge me to consent to the change of location.

During the latter part of the winter and spring of 1828, Mr Johnson made use of all reasonable exertions, as far as I was able to judge, to prosecute the work. He was not however able to employ so large a force as the completion of the job by the time specified, would have required.

About the first of July, as nearly as I can now recollect the time, Mr Johnson requested me to let him have the assistance of some parties of men employed under superintendents in the service of the State, stating that he was unable to employ the necessary force, on account of the apprehensions of sickness. To this arrangement I consented, and the parties of two superintendents were transferred to the work under his charge.

With the assistance of the force thus obtained, the work on the section was so far advanced as to permit the introduction of water about the first of August, and on the sixth day of that month, a boat was passed through the section.

On a part of the job, I think near a mile, the excavation was only carried down near to bottom on about half the breadth of the Canal, leaving earth to be excavated on the remainder of the breadth, from three to five feet in depth. More earth remained to be excavated than was at that time supposed, as the excavation had not been carried to bottom on a considerable dis-

tance, which was supposed to be entirely excavated in the narrow channel above described. The Engineer was necessarily absent at the time part of this was done, and was informed that the channel had been dug to bottom in places where that was not the case.

On the 8th day of August, after Mr Johnson had withdrawn his force from the job, except that part of it which I had finished under the superintendents in the employ of the State; I saw him at Massillon and gave him a check on the Western Reserve Bank, for the full amount of all the work done by him on both sections, as certified by the resident Engineer, at contract prices, deducting the sums previously paid.

At this time he requested me to accept the job as finished, so far as he was concerned, and release him from an obligation further to prosecute the work, on the ground that the water had been introduced, which he insisted amounted to a virtual acceptance. This I declined doing, stating that it would be allowing him to take advantage of his own wrong; that the arrangement for introducing the water and using an unfinished Canal, was made with the mutual consent of both parties; that he had himself introduced the water to assist in floating a quantity of muck into the Lake; and that the State being compelled to use the Canal in an unfinished state, so long after the time for its completion had expired, was owing to his legal, if not moral, fault, and was a misfortune to the other party, the State.

At the same time he proposed to me to pay him the five thousand dollars awarded by Judge Bates, or at least a part of it. This I declined doing, stating as a reason, that he had not complied with the condition on which he was entitled to receive it, as he had not finished the section, nor had he completed even that part of it which was done within the time agreed upon; and that I did not, therefore, feel myself authorized, without the sanction of the Board, to pay him any part of that sum. To this he replied in substance, that he knew he had not performed his agreement, though he had made every exertion to do so, and did not on that account suppose that I should feel myself authorized to pay the sum, but did not know but I might think otherwise.

He stated that he was in great want of a sum in addition to that for which I had given him a check. I offered to loan him a sum, if upon the examination of my funds they were found in a situation to permit it, upon the understanding that he would finish the section when the water could be drawn off; stating to him, I think for the first time, that under the peculiar circumstances of the case, I thought the Board would still further extend the time, and agree to pay him the sum of five thousand dollars awarded, upon condition of his completing the work; though I did not feel myself warranted individually to go so far.

In this supposition I was not mistaken. The Board will recollect that at their last meeting, a resolution was passed authorizing me still further to extend the time for the legal representative of Hiram Johnson to complete his work.

This however they declined doing, and the work was finished by the agents of the State early in the season. The cost of finishing the work which properly belonged to the contract of Johnson and others, was, as near as I can ascertain, \$3,493 50.

About the last of February, 1829, the agent of the administrator on Hiram Johnson's estate, Mr Sizer, called on me, with a copy of the resolutions of the last General Assembly in the case under consideration, requesting me to act in compliance with those resolutions. This I did not think myself authorized to do, as the resolutions were addressed to the Board of Commissioners, and not to me individually, and the Board had not instructed me in relation to the case, except so far as I have stated in the event of the completion of the work by the administrator.

Another difficulty to the compliance with the resolutions, presented itself. The further services of the principal Engineer had been dispensed with; and although he drew his salary to the first of March, the time which it was supposed would be required for him to reach his place of residence in New York, I considered him as virtually having left the service. It will be recollected that "the principal Engineer, with one or more of his assistants," were required to make the estimate contemplated by the resolutions of the General Assembly.

The rules established by the Commissioners of the Canal Fund, relative to the disbursement of that fund, require, that checks in favor of contractors shall be accompanied by certificates of the resident Engineer, certifying that work has been performed under the contract to the amount of the check, in addition to the sums previously paid. In this case no certificate could have been made, and the check, had one been issued, would consequently have been protested, and the Acting Commissioner possibly be made liable for exceeding his authority.

About the same time a note was received from Judge Batés, stating that he would go on and make the estimate required by the resolution, on the second or third day of March, according to my recollection, should I authorize or require him to do so. This I declined doing, for the reasons already stated.

I was not, to my recollection, informed by him nor by any other person at that time, that he had already pretended to make the estimate proposed, in the presence of one party only, and without giving any notice to the other, and also, without having any assistant appointed by the Board, to aid in making the estimate. I was much surprised on learning, a few days since, that such an *ex parte* proceeding had been attempted; and that too without an actual view of the work, and without resorting to any means, so far as my knowledge extends, to ascertain the real value of the work—certainly without giving the Commissioners notice to attend and present any evidence as to its value, or examine any evidence adduced by the agent of the contractors.

In making out this estimate, Judge Bates could not, as I conceive, have been governed by any opinion formed of its value at the time of making the award in 1827, as the difficulties of the work were then taken into view, and formed part of the consideration for which the sum of five thousand dollars was awarded—and he then viewed the subject prospectively, as well as retrospectively, as he states to me in his letter herewith submitted, in which he refers to the grounds on which the award was made.

In relation to the character of the Section, I can state that it proved to be as nearly what it was anticipated to be, at the time of the letting, as almost any job of considerable magnitude on the Canal, so far as I can form an opinion on the subject, with the exception of that part of the Section which was avoided by the change of location previously described.

That part of the excavation which remained unfinished at the time of Mr Johnson's decease, was by far the most difficult and expensive part of the Section, and comprised that part of it which he had pronounced nearly impossible to accomplish. I fully believe that the expense of excavating this remaining part of the earth, which was in the bottom of the deepest part of the cutting, and that part of it where the springs were more numerous and troublesome, was at least three fold the average value of excavating that part of it which was done by the contractors.

Some part of the time during which the contractors were engaged in the prosecution of their work on this Section was peculiarly unfavorable, and unquestionably increased the cost in a very considerable degree; but to what extent I am unable to state. The latter part of the fall of 1827, and the succeeding winter, were extremely unfavorable.

I have very little doubt that a considerable loss was sustained by the contractors on Section No. 1.—But I have no means of ascertaining satisfactorily the amount of this loss. At the time of my making the last payment to Mr Johnson on the contract, which, I think, was between two and three weeks previous to his death, he showed me a statement, or rather estimate in round numbers, of the expenses of the work during 4 or 5 months previous. This statement I considered very inaccurate and unsatisfactory. The number of men stated to have been employed greatly exceeded, in my opinion, the actual number, as determined both by my observations, and those of the Engineer: and the expenses of their board and the use of tools was in my opinion much too high—much higher than the actual expense of furnishing and subsisting an equal number in the employment of the State.

These inaccuracies I pointed out to him, and inquired of him why he did not exhibit an accurate account of the actual cost of the work, if any object was proposed by the exhibition of such a statement. He replied in substance that he could not ascertain the actual cost of the work, as payments to the laborers had been made partly at his store in Middlebury, and partly on the job; that receipts had not generally been taken from laborers and others to whom money had been paid; that regular accounts were not opened with each laborer; and that his books did not show the actual expenditures on the job separate from his other accounts.

Judging from the statement of the assistant Engineer as to the number of laborers, and the wages paid them for the months of March, April, May, June and July, 1828, and from my own knowledge of the expense of boarding and furnishing laborers with tools, I believe that the expenses of the work on Section No. 1, for those months, would not vary materially from \$3000. The estimates made by the Engineer for work performed on Sections No. 1 and 8, during those months, is \$3,514, at contract prices, of which probably \$1,500, was for work on Section No. 8, leaving \$7,014 for the work on Section No. 1. This sum deducted from \$8,000, the estimated cost, will show the probable loss during those months.

During the time on which the foregoing estimate was made, the contractors were in my opinion, performing the most expensive part of the work executed by them on Section No. 1.

Some part of the loss sustained on Section No. 1, was as I believe owing to the injudicious management of the contractor, and his agents; particularly in not continuing the excavation on a level from each end of the Section towards the centre, so as to drain the deepest and worst part of his work; and in not availing himself of the advantage of draining the water from his work into the Summit Lake for a long time after the water in the Lake was drawn off. He was advised to pursue a different course in both these particulars, both by the resident Engineer and by myself, but declined following our advice. If he did not intend to ask relief of the State, he was excusable in declining the advice of its agents.

It has been stated that Mr Johnson was considerably involved in debt at the time of his decease. This I suppose to be the fact: But I am convinced that his embarrassments were occasioned in a great measure, if not principally, by other losses unconnected with this job. I was informed by his clerk soon after his death, that an individual with whom he was connected in extensive contracts on the Pennsylvania, as well as on the Ohio Canal, stood indebted to him on his books in a large amount, I think 8 or 10,000 dollars. And Mr Johnson himself stated that he had lost by another individual, to whom he had sold goods, and for whom he had indorsed, upwards of four thousand dollars.

It has been stated, or intimated, that Mr Johnson received assurances, or encouragements from the agents of the State, that he should be remunera-

ted for his losses if he would persevere and finish his job.—Such statements or intimations so far as my knowledge extends are entirely without foundation. I never at any time gave Mr Johnson, or any other contractor interested in that job, any assurances or encouragement that he would be paid any thing beyond the contract prices, except the sum awarded by Judge Bates, and that only on the conditions herein before stated. In corroboration of this fact, and also for a more full explanation of circumstances and facts not within my own knowledge, I take the liberty of referring to the statements of Messrs Price and Medbery, Engineers, herewith submitted.

ALFRED KELLEY.

Columbus, January 12, 1830.

To the Board of Canal Commissioners:

GENTLEMEN:

The following facts and opinions relating to the contract of Hiram Johnson and others, for Section No. 1, south of the Portage Summit Lake, are respectfully submitted in reply to your queries:

Mr Johnson's business talent, was in my opinion, exhibited to more advantage in the general arrangements for conducting an extensive business, than in the economy and system of its details.—On one occasion in the progress of the work on Section No. 1, at a time when the judicious management of his job, required all reasonable pains bestowed in draining as low as possible the south end of it; the excavation of from a few inches to three feet in depth, on from one fourth to half a mile, would have secured to him at a point where he was soon to direct his principal efforts, three feet in depth of excavation free from water, more than he could otherwise expect. It was urged upon him by both the Acting Commissioner and myself, that this advantage could be attained with little more difficulty and expense, than attended the work as he was then conducting it, and which promised no corresponding advantages.

Mr Johnson declined making the change upon the pretext of insuperable difficulties, the existence of which I could not perceive.—In a few other cases, of less consequence however, his policy did not appear to me the best.

Whilst Mr. Johnson did not, in my opinion, possess in an eminent degree the faculty of conducting an extensive business with exact system and economy—yet his business talent was in my estimation, of a very respectable order.—His activity, perseverance, and enterprise, enabled him to accomplish a great amount of work in a given time, and rendered him a valuable contractor.

The water was retained in the Summit Lake for the use of the Lime mill, but a few days after Rosseter & Barclay's job was in a state to admit of its being drained to the depth anticipated, (which was, I think, in August, 1826,) and was so retained, as I understood, with the consent of Mr Johnson, who was at the time working exclusively south of the dividing height of land on his job. Some time in September, by removing a plank in the dam which retained the water in the Lake, for the purpose of increasing the quantity discharged for the use of the mill, the dam was suddenly undermined and washed away, and all the water discharged in a few hours. I never heard Mr Johnson intimate that his work was damaged by the above mentioned retention of the water in the Lake, nor have I any reason to suppose he sustained any therefrom.

In frequent conversations that I held with Mr. Johnson, on subjects connected with his work, chiefly I think in the year 1828, he repeatedly stated he should lose a large amount of money on Section No. 1. "That he hoped and

confidently expected the Board of Canal Commissioners, or the Legislature, would compensate him—he did not believe their sense of justice would permit them to refuse him relief. They would not see him ruined by faithful and strenuous exertions to complete a work which had been attended by many and unforeseen difficulties, but would he believed, compensate those exertions.” Such as nearly as I can now recollect, was his language on such occasions. I never heard an intimation from him that he had any promise or assurance from the Acting Commissioner, or other authorized agent, that his expenses, beyond the contract, should be in any measure refunded.

Of an admission by Mr Johnson that he was to finish the job in April, 1828, to entitle him to Judge Bates’ award, I have no other knowledge than the inference from the fact that he frequently mentioned, that the Acting Commissioner refused to extend the time for completion, which under the circumstances of the work in 1828, he considered a great hardship.

The full amount of Mr Johnson’s work on Sections No. 1 and 8, was estimated and paid him. The last payment was at Massillon, I think in August, 1828.

My opinion of the comparative value of the work done on Section No. 1, previous to August, 1827, and of the work then remaining to be done, is required. The excavation at that time done, consisted of the surface which had been removed to the depth of from 3 to 6 feet. The excavation remaining to be done, was all that below the last mentioned, extending to the bottom of the Canal.

From the contract price for excavation, (8 3-4 cents per yard,) 3-4 of a cent per yard was deducted, in estimates made the contractor previous to August, 1827. The making the estimates and certificates for payments was at this time a part of my duty.

A considerable proportion of the work done had been attended with the circumstances of disadvantage, which were the foundation of Judge Bates’ award, had been embarrassed by bad weather and want of drains; which causes, it was hoped, would not affect, to an unusual extent, the subsequent operations. The estimate of the work done was therefore at a higher comparative rate than it would have been made under other circumstances.—But these favorable anticipations were in a great measure not realized; and the estimated difference between the work done, and to be done, was too small; in what proportion I am unable to say precisely; it was perhaps less than half what it should have been.

My knowledge in relation to causes of loss sustained by Mr Johnson, other than that on Section No. 1, is entirely derived from a statement made by him in the course of an accidental conversation, concerning his business with Wm. Vanslyke, then dead, and who was believed to have died insolvent.—Mr Johnson stated he had sold Vanslyke merchandize to the amount, as I think, of upwards of \$5,000—he had received in payment but about one thousand dollars; and was consequently a loser by him to the amount of \$4,000, or thereabout.

WILLIAM H. PRICE.

I, Nathaniel Medbery, of lawful age, being duly sworn, do depose and say, that I had frequent conversations with Hiram Johnson, the contractor on Sections No. 1 and 8, south of the Portage Summit Lake, and that in those conversations, I frequently heard him say that he had received no assurance or encouragement from the Acting Commissioner, Mr Kelley, but he would be allowed any more than his contract prices, (other than the award of Judge

Bates, under certain conditions;) but that said Acting Commissioner had seemed cautious not to give any such encouragement or assurance, or to commit himself to any such course; and that I never heard from said Johnson, any assertion or statement at any time, that he had received any such encouragement from said Commissioner.

NATHANIEL MEDBERY.

Sworn to and subscribed before me, the 4th day of January, 1830.

WM. LONG, J. P.

Being called upon to make a statement in relation to Sections No. 1, and 8, of the difficulties, circumstances, &c. attending the construction; and having had the immediate direction and superintendence (in the capacity of assistant Engineer,) of the line of Canal extending from the Summit Lake on the Portage Summit, to Massillon, (of which the above is a part,) from its location to its completion; the following, so far as my memory serves me, will be found correct.

Though from my minutes I can arrive to a certainty at the most important facts in relation to the work, yet the particulars of many of the attending circumstances of minor importance have escaped my memory.

At the time of the letting of said line in the winter of 1826, the Acting Commissioner gave public notice, that nothing more than the contract price would be allowed in any case, or under any circumstances; and particularly requesting those who intended to bid to carefully examine and judge for themselves, of the character and worth of the work for which they intended to bid and wished to contract for, as they would take it on their own responsibility, and at their own risk.

At that time the surface of the water in the Summit Lake, was about nine feet above bottom of Canal; and the Tuscarawas river, about two and sixty-hundredths feet above, (the Lake being at the extreme north end of this division of Canal.) Between these two points, (a distance of 195 chains, and an average cut of about nine and sixty hundredths feet;) the line was located through a swamp and prairie, and at that time was very wet and miry; so much so, that it was with some difficulty, a person could pass over it.

To prevent inconvenience and interference with different contractors, in draining off the water from the work, the aforesaid swamp of 195 chains was put into one Section: as there existed no easy means of draining, only at the north and south ends, the ground being higher on the east and west sides of the swamp.

It was then expected that the Canal on the Summit Level north of the Lake, would be so far completed through the winter, as to enable the Lake to be drawn down in the spring, then next.

Notwithstanding the many and serious difficulties which presented themselves, and the general bad aspect which this Section wore at the time of the letting, there was great competition and much anxiety manifested by different and responsible men to obtain it; particularly by Hiram Johnson and others, whose bid being a very trifle, the lowest on Sections 1 and 8, they were consequently assigned to them. Work soon after was commenced on Section one, under the direction of Mr Prat, one of the Company. The Section for about one half its length was covered with a thick growth of tamarack timber, generally from 4 to 8 inches in diameter; which instead of being grubbed, was chopped off above the surface of the ground, and all the timber piled on the centre line of Canal, with a view, to not only burn the timber, but it was fancied (as the greater share of the earth to be excavated consisted of

muck or vegetable mould) that after the Section should be drained, and after the surface of the ground become dry, a great share of the excavation could likewise be burned. In this they failed of the anticipated success, which operated severely against the interest of the contractors; as not only a great share of the timber had again to be removed by taking it entirely from the line in order to get it out of the way: but to grub the stumps as the timber was then chopped off, was much more expensive than otherwise would have been, had the grubbing been done before chopping the timber, as is usually the case.

The Lake was drawn down about the first of September, 1826, and the attempt to burn the timber, &c. if I rightly remember, was in the spring or summer of 1827.

The above failure and disappointment was in my opinion partially owing to the unfavorableness of the season before and at the time the attempt was made; but more directly to the ditches not being properly cut on each side of the centre, consequently the surface on which the timber lay, was not properly drained.

The cutting on the timbered part of this Section, extending from the Lake about 95 chains south, averaged about eleven and a half feet, and from thence gradually declined south 100 chains to about 4 feet cutting, when the Section terminated; the latter distance being principally through a prairie. The principal amount of work performed through the summer of 1826, was by sub-contractors in cutting ditches from the south end of the Section on each side of the Canal, which had its desired effect, as it left the centre so freed from water that a considerable force might have been employed to advantage in taking out the centre. Some excavation however was done in the centre by sub-contractors at a very cheap rate.

The work for some time after the Lake was drawn down in September, as before mentioned, was continued towards the south end of the Section, principally by ditching, the object of which was stated by the then superintending contractor, Mr Prat, to extend the ditches as far north as possible while the weather continued moderate; which would leave all that could be so accomplished in a situation that a considerable force might be advantageously employed through the winter, by taking out the centre which was left between the ditches. The winter however proved not very favorable; consequently there was not a proportionate part of the work performed, the force through the winter being generally light.

In the spring or early part of summer, 1827, Mr Prat expressed himself much dissatisfied with the work; that it was then very much in debt. I informed him that all the work performed on the Section had been estimated; thereupon he, together with the rest of the company, as I understood, abandoned their interest in the work, excepting Mr Johnson, who from that time conducted the work.

The work was then prosecuted with energy until about the last of July or first of August, when it was suspended; the cause assigned, was on account of the prevailing sickness and difficulty of procuring laborers.

In the progress of the work through the summer of 1827, it was found that a distance of about a half mile near the middle of the Section, and likewise a short distance at the north end joining the Lake, after being excavated from 5 to 3 feet in depth from the surface, would raise in the centre from the effect of the pressure of the banks on the sides.

At the suspension of work before alluded to, said Johnson claimed damages of the Canal Commissioners, on the ground that he had sustained loss in consequence of the Lake not being drawn down as was contemplated at the time of contracting for said work, which was particularly assigned as the cause of

loss, in failing to burn the timber, &c.; it was likewise claimed that a great inconvenience and delay was encountered in ditching, draining, &c. The question was submitted by the parties to David S. Bates Esq. principal Engineer, and as I understood was by him decided; and after some time had elapsed, the contractor recommenced work founded on the decision of the principal Engineer (as I farther understood) to complete it in April, 1828, and receive therefor in addition to the contract prices five thousand dollars, as compensation for damages sustained in consequence of the delay in draining the Lake, and also, in consideration of loss occasioned by the pressure of the aides as before described.

Little work was done however in the autumn of 1827, other than preparations made for prosecuting the work with a competent force.

About this time said Johnson suggested, and urgently requested a change of the line, in order to avoid the difficulty which appeared in the half mile, near the middle of the job, as before described; and after an examination in relation to the subject, the line was finally changed according to the request of the contractor.

This change was essentially to the contractor's interest, as not only the most serious obstacle was avoided; but as the surface was but measurably taken off from the abandoned line, the surface was twice paid for.

The surface had been taken off generally from the whole length of the Section; and the work, under these circumstances, had been estimated at eight cents per yard, which in my opinion was more than it was worth, compared with the more expensive operation of taking out the bottom, as the only difference then reserved, was three fourths of a cent per yard. In answer further to the question in relation to the change of the line. The contractor, (besides the advantages above described) had another important object, as he stated to me, that he considered it in procuring the change, that was to keep good his claim to the award of five thousand dollars, made by Judge Bates, (as the work was not done according to agreement under which he claimed the award,) by urging that the quantity of work had been greatly increased beyond what was anticipated at the time of said agreement; and as it would substantiate a further claim for damage or loss, as there had necessarily to be employed a much greater force of men, consequently worked to a greater disadvantage, and the work made it much more expensive than it otherwise would have been, had not the work been increased beyond what was anticipated at the time of the award and agreement; though the Acting Commissioner on that line, as stated by the contractor, would never give any encouragement other than a strict adherence to the contract. This change of the line made an additional quantity of work, which at contract prices amounts to three thousand five hundred twenty eight and 87 1-2-100 dollars.

The work was prosecuted with much energy and credit to the contractor the ensuing spring and early part of summer, notwithstanding the unusual quantity of rain which fell during that period, which undoubtedly seriously affected the interest of the contractor.

Early in July, 1828, the number of laborers had become much reduced from apprehensions of sickness, and from the demand for labor in agricultural pursuits; and there still remained to be taken out of the bottom from 1 to 5 feet for a distance of more than a mile. From the increased fear of sickness and consequent scarcity of laborers, it was found that the whole work would not be performed as early as was judged expedient by the Acting Commissioner to fill with water that part of the Canal. And the only remaining course to be pursued in order that the Canal might be navigated that season south of the Summit, was to leave remaining in the bottom of the above distance about one half of the width to be taken out; which was done and the water admitted

into that part of the line about the first of August, 1828. Some work, though of comparative small amount, continued to be done by the direction of the contractor in preparing the towing path along said Section, until towards the last of August, when said Johnson died.

The number of men employed in each of the months of March, April, May, June and July, together with the wages paid per month, will not vary materially from the following: March, 90 men at \$11 per month; April, 110 men at \$12 per month; May, 80 men at \$12 per month, (I am not certain but what \$13 was paid towards the very last of the month of May;) June, 65 men at \$13 per month; July, an average of about 40 men at \$13 per month, for the fore part, and \$ 6 for the latter part of the month.

With the exception of the two difficult points which have been described, and the principal of which was avoided by the change of line before described, and the other left unfinished by the contractor, the general character of the work cannot be said to have been materially different from what it appeared and might have been reasonably anticipated at the time of the letting, or when said work was contracted for, other than the unfavorable seasons for doing such work encountered it in its construction.

About the first of March last, I was directed by the Acting Commissioner to employ a competent force of men and complete that part which remained unfinished. The work to be done at that time, embraced the difficulty at the north end of the Section joining the Lake, together with all the principal points where the springs were the most abundant and powerful, and the water by far more difficult to contend with than on any other part of the Section; and notwithstanding the usual wet and unfavorable weather encountered, the obstacles were surmounted without any extraordinary exertions, and the object accomplished in a very short period.

Section 8 had been completed some time in July, 1828, the work having been carried on principally by agents and sub-contractors. On this Section was a lift lock and a dam of considerable extent, and other work of considerable magnitude connected therewith. The plan and manner of doing the work was materially changed from what was contemplated at the time when it was contracted for, the quantity of work greatly increased, and very much to the interest of the contractor.

All the work performed by the contractor or his agents on the two Sections, has been estimated at contract prices and according to the rules of estimating work.

NATHANIEL MEDBERY.

January 3d, 1830.

To the Board of Canal Commissioners:

In answer to your questions relating to Sections 1 and 8, of the Ohio Canal, contracted for by Hiram Johnson and others, I submit the following facts and opinions:

The commencement of work was delayed on Section 1, in the fall of 1827, for some time after the Acting Commissioner requested and thought proper, it should be commenced. This delay, in my opinion, (and as has been demonstrated since,) was unwarrantable, compared with the amount of work then to be done, and the time fixed for its completion; as I believe as much or more work might have been done in the fall of 1827, in the time of this delay, as remained to be done at the time when the contractor, Mr Johnson, left the work in the summer of 1828—though I am not aware that the con-

tractor had any design in thus delaying the work, as he expressed himself fully in the belief at that time, that he could complete the work by the time required—which probably might have been done, had the season proved favorable.

At the time the Lake was drawn down in the fall of 1826, the principal force was employed toward the south end of the Section, and was preferred by the contractor to be continued there for some time after the Lake was so drawn down, and the Section left in a situation that any part of it could be worked to advantage.

I had frequent conversations with Mr Johnson, in relation to the difficulties of the work, and the effects of the disappointment by the Lake not being drawn down as was expected. These conversations were more frequent a short time previous to Judge Bates' making his award in the summer of 1827. Mr Johnson then stated from the best calculation he was able to make from the standing of the work, that with five thousand dollars, he thought he should be able to complete the work without a loss, should the seasons prove favorable; that he did not expect that amount from the circumstance alone of the Lake, but hoped that Judge Bates in making his award, would consider the difficulties encountered at two different points on the Section, where the earth was forced into the Canal.

At the time Judge Bates made the award, Mr Johnson and myself were present in examining the character and difficulties of the work, which were explained together with every thing relating to it, that he might understand the supposed amount required to enable the completion without a loss. But as the seasons have been since, I am of opinion that the estimate was too small.

In relation to Section 8, had the dam been built previous to the expiration of the contract, the serious difficulties would undoubtedly have been avoided, and I have no doubt would have saved to the contractor a greater expense, as in such an event, the difficulties encountered, in putting the foundations for the dam, in the winter and spring of 1828, caused by the unusual quantity of rain and consequent high water, would have been avoided.

Owing to the late period in which the work was done, the difficulties become unavoidable, but were encountered with that determined perseverance which had before distinguished the contractor.

I was knowing to a considerable amount of work, (excavation,) being done on Section 1, in the prairie, by sub-contractors, at the rate of five cents per yard; and was informed by them that they made at the rate of one dollar per day.

NATHANIEL MEDBERY.

Columbus, January 12, 1830.

CANAL COMMISSIONERS' OFFICE,
COLUMBUS, JANUARY 28, 1830. }

To the Hon. Speaker of the Senate:

SIR—

The Board of Canal Commissioners, herewith transmit their answer to the resolution of the Senate, of the 27th inst. in relation to the water privileges proposed to be granted to Walter M. Blake, Esq.; which they request you to lay before that body.

Very respectfully,

Your humble servant,

ISAAC MINOR, *President.*

SPECIAL REPORT

Of the Board of Canal Commissioners. in relation to granting Water Power to Walter M. Blake.

To the Hon. Speaker of the Senate:

In obedience to the resolution of the Senate, requesting the Board of Canal Commissioners, to communicate to the Senate, information in relation to the water privileges, proposed to be granted to Walter M. Blake, by a bill pending therein; the Board submit the following statements and opinions:

The information first requested by the resolution, is, in relation to "the nature and value of the water privileges, propose to be granted."

In relation to this inquiry, we have to state, that the Lock at which the water power in question, is situated, is one of 11 feet lift. The fall of the water from the level above the Lock to that below, is consequently 11 feet. The water which is required to supply the Canal, between this Lock and the Tuscarawas Feeder, about 6 1-2 miles, is to pass round this Lock, from the level above, to that below, over a tumbler of stone masonry, erected for that purpose. The quantity of water which will be required to pass round this Lock, to supply the leakage, lockage and evaporation, on the 6 1-2 miles of Canal above described, will probably be about 600 cubic feet per minute. This quantity of water, applied on an overshot wheel, of the height which may be here used, will be sufficient to keep in operation, two pair of 4 or 4 1-2 feet mill stones, judging from the best data in our possession. The water in passing round the Lock, may as well drive machinery, as to pass without being used, provided the machinery or mills, are of such a description, as to do no injury to the Canal, either by causing trash or rubbish to be thrown into the water, or, by occasioning an unequal and violent flow of water, so as to injure or endanger the banks. Both of these evils should, of course, be guarded against, either by law, or in the deed of conveyance.

The level immediately above this lock, crosses Sugar creek, by means of a dam, and consequently receives the waters of that stream, the surplus of which, after supplying the quantity necessary for hydraulic purposes, and for navigation, are passed over the dam. By this dam, the water is raised and set back in the channel of the stream, so as to overflow a dam erected and owned on the creek above, by Messrs Deardorff & Slingluff; and their mill site thereby destroyed. As an equivalent for the destruction of their old dam and mill, an arrangement has been made with these gentlemen, to permit them to use from the level of the Canal, which crosses the creek, the waters of that stream, or so much thereof, as they may find convenient, under certain restrictions, limitations and conditions, deemed necessary, to prevent any interruption or interference with the navigation of the Canal, or with the water necessary for that purpose. This arrangement with the former owners of the hydraulic privileges on this part of Sugar creek, makes it necessary to limit the grant to any other person, of hydraulic privileges, derived from this level, in such a manner, as not to interfere with the prior rights of Deardorff & Slingluff.

It is very evident that during part of the year, the quantity of water furnished by Sugar creek will greatly exceed the amount which can be advantageously used, by Messrs Deardorff & Slingluff, and that there may be used, at the Lock, any desirable quantity which can safely be permitted to flow in the Canal.

From this view of the subject, it seems probable that there must, at all times, pass round the Lock, a quantity of water sufficient to drive two pair

of mill stones, and that when Sugar creek is high, the quantity may be safely increased to double or treble that amount.

The value of hydraulic power depends on so many circumstances, that it is somewhat difficult to form a satisfactory opinion on this subject. The plenty or scarcity of similar privileges in the neighborhood; the amount of business required to be done by water power, in a given section of the country; the inducements offered for the investment of capital in manufacturing establishments of any kind; the permanency of the supply of water, and the expense of keeping dams, races and other necessary structures in repair, are all to be taken into consideration, in determining this question.

Taking all these circumstances into view, and referring to proposals made for the purchase of water power, in various other places, we are induced to believe that the privileges in question are reasonably worth from \$200 to \$250 per annum.

In relation to the subject of granting water privileges; generally, to persons who may own the land, where water from the Canal may be used for hydraulic purposes, it will only be necessary to remark, that in the opinion of the Board, no doubt can exist as to the right of the State to the water power created by the exertions of the State, and the application of the public funds. To give to individuals these important and valuable privileges, merely because they are so fortunate as to be the owners of the land on which these privileges happen to be located, without any other consideration, would, in our opinion, be granting to those individuals a large amount of public property, to which they have neither a legal nor equitable claim; and diminish the funds of the State, which ought to be devoted to other purposes, to which they are specifically pledged.

Where, in the opinion of the General Assembly, the State is justly indebted to an individual, who is an applicant for a grant of the privilege, either to an amount equal to the value of the privilege asked for, or a proportion thereof, or where the fair value of the privilege is paid by the applicant; no objection is perceived to the grant, under proper limitations, reservations and restrictions, to secure the interests of the State, and of other individuals whose rights may be liable to be affected by such grant.

Respectfully submitted,

By order of the Board,

ISAAC MINOR, *President.*

CANAL COMMISSIONERS' OFFICE, }
COLUMBUS, JANUARY 30, 1830. }

To the Speaker of the House of Representatives:

In obedience to a resolution of the House of Representatives, of the 26th instant, directing the Board of Canal Commissioners, "to report to the House, the number of Engineers now in the employ of the State; how many have been discharged, and how many are actually necessary to be employed at this time; and the exact amount received and due each one for his services, annually; how employed in each winter previous, and how employed this winter:" the Board has the honor herewith to submit a statement marked A, which shows the number, rank, pay, and location of the Engineers, and Assistant Engineers, now in the service of the State; also, a statement marked B, which shows the number which have left the service by resignation or death, since 1822.

The number which are now in service, is that which is required, to discharge properly, the duties connected with the construction and superintendence of the Canals. This number may be somewhat reduced, upon the full completion of the line in the Tuscarawas valley, in the spring, but cannot be, prior to that time.

During the winter months, the Engineers are engaged in the discharge of their respective duties on the lines, which continue through all the months of the year, without intermission. When from the inclemency of the season, contractors are doing but little work on the line, the Engineers are engaged in maturing and preparing the plans, particularly of mechanical structures, in making the necessary calculations and extensions preparatory to the final accounts of each contract, and in arranging and bringing up their books.

Their engagements during the present winter, do not materially differ from former winters, except that some individuals of the corps have visited the seat of government, by the orders of the Board, to give testimony in relation to the numerous cases of claims of contractors, for further sums of money; which have been referred by the Senate, to the Board of Commissioners, to examine and report upon.

By order of the Board,

ISAAC MINOR, *President.*

Arrangement of the Corps of Civil Engineers in the service of the State of Ohio:
JANUARY, 1830—ON THE OHIO CANAL.

<i>Names.</i>	<i>Rank.</i>	<i>An- nual pay.</i>	<i>An'l sub- 'nce.</i>	<i>An'l h'rse k'p'g</i>	<i>Length of dis- trict.</i>	<i>Where, and how employed.</i>
Richard Howe	Resident	\$720	\$156	\$52	67 miles	From Lake Erie to Massillon, as Superintending Engineer.
Leander Ransom	do	720	156	52	68 "	Massillon to Caldersburgh, as Superintending Engineer.
Gardner Field	Senior Assistant	540	156			
Andrew Young	do	540	156			
John B. Warren	Junior Assistant	360	156			
Lewis Roberts	do	360	156			
Byron Kilbourn	Resident	720	156	52	55 "	Caldersburgh to Deep Cut, as Superintending Engineer.
Sebried Dodge	do	720	156	52	29 "	Deep Cut to Columbus Feeder, as Constructing Engineer.
Wm. H. Knapp	Junior Assistant	360	156			
Darius Lapham	do	360	156			
Nathaniel Medbery	Resident	720	156	52	27 "	Columbus Feeder and Main Line to Circleville, as Constructing Engineer.
John McCarthy	Junior Assistant	360	156			
Jesse L. Williams	do	360	156	52	24 m 52 c	Circleville to Paint Creek, as Constructing Engineer.
O. P. Jennison	Junior Assistant	360	156			
Wm. R. Williamson	do	360	156			
Wm. H. Price	S. Resident	1200	200			
Thos. B. Adams	Senior Assistant	540	156	24	m 64 c	Paint Creek to Pee Pee Bluffs, as Constructing Engineer.
Charles Voorhies	Junior do	360	156			
Francis Cleaveland	Resident	720	156	52	23 m 10 c	Pee Pee Bluffs to Ohio River, as Constructing Engineer.
Stearns Fisher	Junior Assistant	360	156			
Timothy G. Bates	Senior do	540	156			

ON THE MIAMI CANAL.

Samuel Forrer S. Resident 720 | 156 | 52 | 66 miles | From Dayton to Cincinnati, as Superintending Engineer.

Engineers formerly in the service of the State, removed, by re-signation or death.

<i>Names.</i>	<i>Rank.</i>	<i>Remarks.</i>
James Geddes	Principal	Term of service expired in 1822
David S. Bates	do	Discharged in March, 1829
Alexander Bourne	Exploring	Resigned, Spring, 1827
John Bates	Resident	Left service do 1826
William R. Hopkins	do	Resigned do 1828
Joseph Ridgway, jun.	do	do do 1829
Isaac Jerome	Assistant	do do 1822
Seymour Skiff	do	Died Fall, 1823
Thomas J. Matthews	do	Resigned do 1824
John Forrer	do	Died Spring, 1827
James M. Buckland	do	Resigned Fall, 1827
John Brown	do	Died Summer, 1829
Peter Lutz	do	do do 1827
Robert Anderson	do	do do 1828
Dyer Miner	do	do Fall, 1827
William Lattimore	do	do do 1829
Isaac N. Hurd	do	Resigned Summer, 1829
Charles E. Lynch	do	do do 1828
Philo N. White	do	do Spring, 1827
James H. Mitchell	do	do January, 1829
John S. Beasley	do	do December, 1829

SPECIAL REPORT,
Concerning Ship Lock No. 44.

To the Honorable, the Speaker of the House of Representatives:

In obedience to the resolution of the House of Representatives, of the 29th ult. requesting "the Acting Commissioner on that part of the Ohio Canal, lying north of the Portage Summit, to report to the House, the amount expended towards the construction of Ship Lock, No. 44, being the northerly Lock, on the Ohio Canal; setting forth the name or names of the contractor or contractors on said Lock; the amount paid to each contractor; the time when the work on said Lock was commenced; and the time and probable expense necessary to complete the same;" I have the honor to Report:

That on the 30th day of March, 1827, a contract was entered into with James Stewart and William Van Slyck, for constructing section No. 118, of the Ohio Canal, north of the Portage Summit, which section includes Locks Nos. 43 and 44; and, also, the excavation, embankment, and other work necessary to complete the Canal, between the lower end of the "upper Basin," so called, and the river, at the village of Cleaveland.

Some time in the month of May following, according to my present recollection, the contractors commenced procuring stone for the two Locks—both of which were designed to be of sufficient depth and dimensions, to admit the passage of schooners, sloops and other vessels, steam boats excepted, which are usually employed in the Lake navigation. The dimensions are as follows: The chamber 100 feet long, 25 feet broad in the clear, and 8 feet depth of water over the mitre sills in the lowest stages of water.

Lock No. 43, was completed in 1828; I think in the month of June; but my recollection as to the precise time, is not distinct.

The excavation of the Lock pit, for Lock No. 44, was commenced in the summer of 1827, agreeably to my recollection on the subject; but little progress was, however, made in the excavation of the pit during that season.

Early in the spring of 1828, the surviving contractor, James Stewart, found himself unable to progress with the excavation of this pit, on account of the great quantity of water which flowed into the pit, through a soil extremely loose and porous, and the consequent expense attending the pumping of the water, and carrying on the excavation, under those circumstances.

Finding it necessary to release the contractor from his obligation to perform this part of his job, or to compel an abandonment of the whole, by refusing to allow him to relinquish the excavation of the pit, I concluded to adopt the former alternative, as least injurious to the contractor and to the State.

A contract was made with John A. Ackley, to complete the excavation of the Lock pit, and to perform the extra work of putting in and securing the foundation of the Lock. Not having a copy of this contract at this place, I am unable to state the exact date: It is, however, believed to be about the first of April, 1828.

The sum actually paid under the contract of Stewart and Van Slyck, is \$15,033 50. The total value of the work certified to have been done under that contract, is \$15,323 50. The total amount certified and paid under the contract of John A. Ackley, is \$5,543 92. The work under this contract is closed, and the full amount certified and paid.

I believe that both of the Locks are now completed. Lock No. 44 was completed when I was at Cleaveland in November last, as I understood from the Engineer, with the exception of fixing the iron straps and collars, which maintain the gates in their upright position. The fixing of these straps was delayed a few days, on account of the coldness of the weather, which made it difficult to cut the stone, into which they were to be fitted.

A few yards of earth remain to be excavated immediately above the head of Lock No. 44; and about 1000 cubic yards, between the Lock and the river. This excavation, together with a pavement of rough stone, to protect the banks and bottom of Canal, at the foot of the Lock, from the violence of the current passing through the paddle gates and trimming the banks, comprises all the work that remains to be done, in order to finish the whole Section, as far as I am informed on the subject.

As the accounts for the whole work done under the contract of Stewart and Van Slyck, have been kept together, and the expense of the several items, does not appear separately on my books, I am unable to state precisely, what proportion of the sum paid, has been applied to the building of Lock No. 44.

Agreeably to an abstract taken from the Engineer's books of estimates, the total expense of constructing Locks No. 43 and 44, including foundations, pits, grubbing posts, pavement of banks, and securing foundations completed, is \$20,422 84. I am unable to separate exactly, the expenses of the two Locks, as they were both built under one contract; and a small amount of work done under the contract of John A. Ackley, it is believed, was performed in securing Lock No. 43. The expense of each Lock, however, varies very little from the following sums:

Lock No. 43, including excavation of the pit, and all other expenses necessary to complete the same, \$7,200.

Lock No. 44, including expenses of excavating pit, putting in and securing foundation, and other work necessary to complete the same, \$13,222 84.

The height of the walls of Lock No. 43, is equivalent to those of an ordinary Lock of 10 feet lift; and those of Lock 44, to the walls of one of 12 feet lift—making the two Locks equal to two ordinary Locks of 11 feet lift each; or, together, of 22 feet lift: besides the extra length and breadth of the Locks.

Considering the great difficulty which always attends the putting in of foundations, ten or twelve feet below the surface of low water, particularly in loose, porous earth, it is believed that few works of the kind have been accomplished more economically, or secured more permanently.

Respectfully submitted,

ALFRED KELLEY,

Acting Commissioner.

February 2d, 1830.

SPECIAL REPORT

Concerning the proposed junction of the Miami Canal with the Ohio river at Cincinnati.

CANAL COMMISSIONERS' OFFICE,

FEBRUARY 16, 1830. }

To the Honorable Speaker of the House of Representatives:

The Board of Canal Commissioners, in obedience to a resolution of the House of Representatives of the 12th inst. requesting information on sundry points in relation to the connexion of the Miami Canal with the Ohio river at Cincinnati, respectfully state:

1st. That the cost of extending the Canal from the head of Main-street to the river, by the construction of locks in the ordinary method, is estimated at \$100,000 to \$110,000. A detailed estimate of the expense of this work has not been made; but the location was so far completed as to give the amount

of masonry required for the locks, and an approximation to the amount of excavation for the pits, pounds, &c. A sudden and unexpected rise in the Ohio, in the month of October last, prevented the Engineer from making the full and detailed estimate which had been directed; but sufficient data were obtained to enable him to make an estimate which may be relied upon as approaching very nearly to the true result. The section of this line between the head of Main-street, and the termination of the level at the head of Broadway, now under contract, is estimated to cost \$1500; and the section crossing the immediate valley of Deer creek, at \$7,806.

2d. The inquiry which relates to the relative expense and advantages of locks and inclined planes to be used between the present termination of the Canal and the river, is one which the Board has no means of answering satisfactorily. The experience in the United States, in the construction and use of inclined planes, for the transfer of boats from one level of a Canal to another, is yet very limited; and so far as it is known that they have been introduced, is yet but an experiment, to say the least, of doubtful practical utility. It is, therefore, difficult for the Board to give a satisfactory estimate of the expense of connecting the Canal with the river upon this principle; it certainly cannot be done without more time for investigation of the subject than is now afforded.

Of the advantages of the inclined plane, compared with the ordinary lift lock, the Board cannot speak from observation or experience. But from the fact of the great simplicity and safety of the latter, compared with the more complex and delicate operation of the machinery required in the former; and from the fact also, that in almost all Canals either constructed or constructing in this country, or in Great Britain, locks have been, and still are preferred, it is the opinion of the Board that it would be highly inexpedient to adopt the inclined plane in connexion with any part of the Canal of this State, unless driven to it by the want of the necessary supply of water for locks. Inclined planes have principally been used where a deficiency of water prevented the use of locks, or where the descent to be overcome was too precipitous to admit of their convenient and proper distribution.

3d. It is admitted that an inclined plane would require less water from the upper level of the Canal than will be necessary to supply locks; how much less, the Board has not sufficient information on the subject to determine. Whatever this difference may be, the quantity of water applicable to hydraulic purposes will be lessened proportionably. This cannot, however, produce a very material reduction in the amount of hydraulic power at this point. To fill a lock of 10 feet lift requires 14,850 cubic feet of water; admitting 10 boats to arrive at, and the same number to depart from Cincinnati by way of the Canal in each day, and that one half of this number will pass through the locks to and from the river under circumstances requiring a lock full of water from the upper level for each boat, the quantity of water thus drawn from the Canal for the lockage of ten boats per day to and from the river, will be 148,500 cubic feet, equal to a constant flow of 103 cubic feet per minute. This quantity applied to an overshot wheel of 15 feet diameter, will give about two thirds of the power required to operate one run of 4 1-2 feet mill stones. A series of six 15 feet wheels in succession, with 18 inches between the level of each wheel, will place the lower wheel within about 12 feet of low water in the Ohio, showing upon these data that the loss of water by locks will be equal, through the whole descent, to the power required to operate four run of mill stones, nearly one half of which power will be situated below the level of the highest flood of the river. It will be observed that in this view of the question submitted, the quantity of water actually required to supply an inclined plane with moveable locks, is left as an offset to the

quantity required to supply the absorption and evaporation on the line of Canal between the head of the lock and the river, which would unquestionably exceed the requisition of the Canal.

In relation to the authority to extend the Canal to the river, no doubts have been entertained by the Board. It is true, that clause of the act of 1825 which authorizes the construction of the Miami Canal, is indefinitely worded as respects its southern termination; but the intention and spirit of that act as shown by the facts and circumstances connected with its passage, and by the evident interests of the country intended to be secured thereby, left on the minds of the Commissioners no doubt of its being their duty to give it a liberal construction.

The plans and estimates submitted to the General Assembly in the annual report of 1825, upon which the law in question was based, extended to, and connected the Canal with the river.* And its present location through the City, which was made soon after the passage of the law, was made in a measure with reference to a connexion with the river at the point now proposed, and, so stated to the General Assembly in the first annual report of the Board, after the commencement of the work on the Canal.† In reporting to the General Assembly in December, 1826, the making of the contracts into, and through the City to the head of Main-street, special reference was again made to a connexion of the Canal with the river by locks;‡ which is referred to only to show the settled construction of the law by the Commissioners, the acquiescence of the General Assembly in that construction, and the general understanding that the Canal was intended to be connected with the Ohio river.

To have given this law a third construction would have produced a result so much at variance with common sense, and with the public interests, as to show at once its absurdity. And if to avoid so absurd a conclusion, the Board found it a duty to give a liberal construction to the act, and thereby to take the Canal into the City, by what rule shall that discretion be limited but by the evident spirit and intention of the law, as shown by the facts and circumstances connected with its passage, all of which very evidently point to a junction with the Ohio river as the original outline, and design of the Legislature at the time of its passage. But a literal construction of the law does not in the opinion of the Board prevent the continuation of the Canal to the Ohio river; as the law does not fix the point in Cincinnati, between which, and Mad river, the Canal should be made, the Board have considered themselves as being fully authorized to fix that point, and in determining on that point to have reference to the evident intention of the Legislature in the passage of the law.

By order of the Board,
ISAAC MINOR, *President*.

SECOND SPECIAL REPORT.

Concerning Ship Lock No. 44.

To the Hon. the Speaker of the House of Representatives:

SIR:—I have this moment seen the report of the select committee, to whom was referred the report which I had the honor to make to the House, in obedience to a resolution of that body, requiring certain information in rela-

*See Kilbourn's Canal Documents, pages 121, 124, 131, 136, 141.

† do do do do 187.

‡ do do do do 246.

tion to Ship Lock, No. 44. Previously to my seeing this report of the select committee, I had not believed my report to the House susceptible of being so completely misunderstood, as due respect to the official station which is occupied by the chairman of that committee, now requires me to admit. I yet remain to be convinced, that a fair construction of the language used in my report, will sustain the committee in the view which has been taken of the subject.

After stating the difficulties which attended the excavation of the pit for Lock 44, my report proceeds thus: "Finding it necessary to release the contractor," (James Stewart, surviving partner of the firm of Stewart and Van Slyck,) from his "obligation to perform this part of his job, or to compel an abandonment of the whole, by refusing to allow him to relinquish the excavation of the pit, I concluded to adopt the former alternative," (viz: To allow him to relinquish that part of his job, which consisted of the excavation of the pit,) "as least injurious to the contractor and to the State."

The fair construction of this language, as I conceive, is, that the surviving contractor was permitted to relinquish the excavation of the pit, and to proceed with the remainder of the job; and such was the fact. Yet the committee say in their report, "that in the following spring the contract was released, on the part of the Commissioner;" leaving it to be inferred, agreeably to the fair construction of their language, that the whole contract was released.

The committee then proceed to say: "The amount paid on this contract, before it was released, is stated to be \$15,033 50." It is presumed that no such statement can be found in my report to the House.

The report of the committee further states, that "it is much regretted; that from" my "report, no definite opinion can be formed by the committee, of the cost of Lock No. 44: no definite opinion can be formed of the cost of Lock No. 43; nor of the cost of Section No. 118; nor, indeed, of the cost of the whole, taken collectively." It is not easy to discover how the committee find so much difficulty in forming a definite opinion of the cost of these two Locks, when the actual cost of the two Locks, completed, is stated in my report, and the cost of each, separately, is also given, as nearly as some small items of expense, which relate partly to the one and partly to the other, will permit. The reason why the exact expense of each Lock separately, cannot be determined, is fully, and, as I trust, satisfactorily stated, in my report to the House. This exhibit of the expense of the two Locks, is not taken from the "original estimates of the Engineer," as stated in the report of the committee; which statement is not warranted by the language of my report to the House, nor by the facts in the case; but is taken from the final estimate of the Engineer, after the completion of all the work on both Locks, with the trifling "exception of fixing the iron straps and collars which maintain the gates in their upright position."

The committee intimate that the information, which it was the intention of the resolution to elicit, as to the expense and time necessary to complete the Lock, has not been communicated. It is difficult for me to conceive how a more satisfactory answer, to this branch of the inquiry, could have been given, than to state, as I did in my report, my belief that the Lock in question was already completed, and the reason or facts on which that belief was founded, and also, to give the actual cost, taken from the final estimates of the Engineer of the Lock; which estimate was predicated on the supposition of its being finished, and consequently included the expense of the trifling item of work which, at the time I was last at Cleveland, remained to be done on the Lock. It is true that I might have stated, "that no additional time or expense was required to finish that which was already completed."

but such language was not deemed sufficiently respectful, to be used in an official communication addressed to the honorable House: It was not, therefore, adopted.

The committee refer to the annual report of the Board of Commissioners to the General Assembly, at the session of 1826-7, in reference to the subject of extending the Canal beyond the point originally proposed for its northern termination, which states that "about \$20,000, is added to the expense of the Canal by this extension of the line." The committee, in their report, assume this sum as being the *total estimated cost* of the new line, or that part of the Canal which extends beyond the original point of proposed termination. This, as I humbly conceive, is not giving to the language of the report of the Board, its fair and natural construction. This sum is stated as being the *difference* in expense between the plan originally proposed, and that subsequently adopted, and *not* as the *entire cost* of the new line. The same amount of lockage was required on either plan, as will be obvious on little reflection; and by the adoption of the new plan, the locks which would have been necessary on the old plan were dispensed with, and the cost of their construction of course avoided. The expense of a towing path along the bank of the river, from the point first proposed for the termination of the Canal, to Cleaveland, which was estimated at \$4690,* was also, principally saved. Any conclusion, therefore, which the select committee may have formed, as to the total cost of that division of the Canal which was added to the old line by the change in question, by comparing my report to the House with the previous annual reports of the Board, are, as I humbly conceive, entirely gratuitous and unfounded.

The supposition that *six miles of Canal* was added to the line first contemplated, by the change referred to, as intimated or assumed, in the report of the select committee, is incorrect. In the *same paragraph* of the annual report of the Board, from which the committee have quoted, the Canal Commissioners, in speaking of the change in question, use these words, "thus substituting *less than three miles* of Canal in lieu of upwards of four miles of river navigation."†

It is true that the Canal was finally extended near half a mile further than was contemplated at the time of making the annual report of the Board above referred to; and also, that the plan of constructing Sloop Locks, at its termination, instead of Boat Locks, was adopted subsequently to the time of making that report. These further changes will account for the difference between the extra expense of continuing the Canal beyond the original proposed point of termination, as stated in that report, and the extra expense as stated in the next succeeding annual report of the Board. The actual cost of this division of the Canal, which was added to the old line by the changes above referred to, can be stated within a few dollars, if the information be desired by the House. This information would have been given in my report to the House, had it been called for by the resolution, to which that report was an answer.

The object of the select committee does not very obviously appear from their report. That report does not propose any method for obtaining the information sought for by the resolution of the House, and which the report intimates has not been communicated by me, in obedience to the spirit of the resolution. If that information was important at the time the resolution in question was introduced into the House, it is conceived to be equally important now; and if it has not already been communicated, I am anxious that it should be put in the possession of the House.

*See Canal Documents, page 201.

†Canal Documents, page 236.

I therefore, respectfully request, that if any doubts exist as to the facts stated in the report which I have the honor of making to the House, in obedience to their resolution, or as to the withholding on my part, of any required information, a committee may be appointed to examine fully into the subject; and that the result of such examination, may be duly reported to the House, and receive the same publicity which is, or may be given to the report of the select committee now before the House.

I take the liberty of addressing to you this communication, with a request that it be laid before the honorable body over whose deliberations you preside. This I do from a conviction that it is due as well to the House, as to the public and to my own character, as an agent of the State, to prevent the erroneous impressions which the report of the select committee is calculated to produce, if suffered to remain unexplained. I feel a great degree of reluctance to trouble the House on a subject which may, in some measure, be considered, as of a personal nature; but no other method is perceived of doing myself justice, or of setting a matter in its proper light, to which some importance is attached, by the course pursued by an honorable member and committee of the House.

I have the honor to be, Sir,

Very respectfully, your obedient servant,

ALFRED KELLEY.

February 16, 1830.

AN ACT to regulate the Navigation and Collection of Tolls on the Canals of this State.

SEC. 1. *Be it enacted by the General Assembly of the State of Ohio, That* no boat or vessel of any kind, except such as shall have a firm and permanent bow, which shall be at least as sharp or acute as a semi-circle, shall be permitted to navigate or float on either of said Canals of this State, under a penalty of ten dollars; for the payment of which such boat or vessel, and also the owner thereof, shall severally be liable; and every time such boat or vessel shall be moved on either of said Canals, the distance of one mile or upwards, shall be considered a distinct offence.

Sec. 2. No raft or float, composed in whole or in part of round or unhewn timber, shall be permitted to float, or be navigated on either of the Canals of this State; nor shall any fire wood, or other split or sawed wood, or lumber, be transported on either of said Canals, otherwise than on board of such boat as may lawfully navigate the same; under the penalty of ten dollars for every offence in either of the cases herein specified; for the payment of which penalties such raft or float, and also, the owners thereof, shall severally be liable.

Sec. 3. If any person in navigating or managing, or assisting in the navigation or management of any boat or other float, on either of the Canals of this State, shall, through design or negligence in the navigation or management thereof, injure any lock, lock-gate, waste-gate, guard-gate, bridge, aqueduct, or other work or devise, appertaining to either of said Canals; such person shall, for every such offence, forfeit and pay the sum of twenty-five dollars, as a penalty for such offence; and every master, owner, or part owner of such boat or float, and also the boat or float itself, shall severally be liable for the payment of such penalties, and moreover be liable for the payment of all damages occasioned by such mismanagement or negligence.

Sec. 4. No float shall move on either of the Canals faster than at the rate of three miles an hour, where such Canal, or the part thereof on which such float shall move, shall have been at such time navigated less than one year;

and in no case shall any float move on either of the Canals faster than at the rate of four miles an hour; under the penalty in either case, of ten dollars for every violation of this section; for the payment of which the master, manager, owner or part owner of such float, and also the float itself, shall severally be liable.

Sec. 5. When a boat or other float shall overtake any other boat or float on either of the Canals, it shall be the duty of the master or manager of the latter, to turn from the towing path, and give to the former every practicable facility for passing, and to stop whenever it shall become necessary, until the boat or float first mentioned, shall have fully passed.

Sec. 6. When any float, in passing on either of the Canals, shall meet any other float, passing in an opposite direction, it shall be the duty of the master of each to turn to the right hand, so as to be wholly on the right side of the centre of the Canal; and the horses or other moving power of the boat, which in turning to the right as aforesaid, shall turn from the towing path, shall be stopped so as to allow the moving power of the other and the float itself to pass freely over the towing rope of the float so turned from the towing path.

Sec. 7. Whenever two or more floats, moving in opposite directions on either of the Canals, shall at the same time approach any place, where, from the contracted breadth of such Canal, or other cause, they cannot safely pass each other; it shall be the duty of the master of every such float, going from Lake Erie on the Ohio Canal, or from the Ohio river on the Miami Canal, or from Columbus on the Columbus Feeder, to stop at such distance from such place, as will permit the float or floats moving in the opposite direction conveniently to pass by, and there to wait until such passage is effected.

Sec. 8. Any float moving on either of the Canals, which shall have arrived within one hundred yards of any lock, in which the water is on the same level with such float, shall be permitted to pass such lock, before any float not on the same level.

Sec. 9. If on the arrival of any two or more floats, at or near to any lock, a question shall arise between their respective masters as to which shall be first entitled to pass, such question shall be determined by the lock keeper, or any other agent of the State having charge of such lock, if any such lock keeper or agent be present; and each float shall be passed in the order and manner in which such lock keeper or other agent of the State shall direct.

Sec. 10. No setting pole or shaft, pointed with iron, steel, or other metal, shall be used in the navigation or management of any float on either of the Canals of this State.

Sec. 11. No person shall attempt to pass any float into any lock, or out of any lock, until the main gates at the head or foot of said lock, as the case may be, between which gates such float shall be about to pass, shall first be entirely opened into their respective recesses, nor until all paddle and culvert gates of such lock shall be closed.

Sec. 12. Neither of the main gates at the head or at the foot of any lock shall be closed, or allowed to close of their own accord, while either of the paddle or culvert gates at the opposite end of said lock shall remain open.

Sec. 13. When any float shall pass out of any lock, the main gates of such lock, through or between which such float shall have passed out, shall be left entirely open, and completely within their respective recesses; and all the paddle and culvert gates of such lock shall be left closed: *Provided, however,* That where the Acting Commissioner or Superintendent having charge of that part of the Canal in which such lock is situated, shall direct any paddle, culvert, or other gate, to be left open for the purpose of passing water through the same, such direction shall be complied with and obeyed by all lock keepers.

masters of floats, boatmen, and all other persons concerned in navigating such Canal.

Sec. 14. No boat or other float shall be permitted to pass into any lock, nor to strike against any part thereof, with such force as to injure, or be liable to injure, any part of such lock, or any gate or other work or devise appertaining thereto, or designed to protect the same.

Sec. 15. No lock-gate, culvert-gate, or paddle-gate, shall be closed, nor permitted to close itself with such violence, as to injure, or be liable to injure the same.

Sec. 16. Every master of any float who shall violate either of the provisions of the eleven sections next preceding this section, or who shall permit any boatmen or other person assisting in the navigation or management of such float, to violate either of the said sections or any provision thereof, shall, for every such violation, forfeit and pay the sum of ten dollars; and every owner or part owner of any such float, and also such float, shall severally be liable for the payment of all penalties so as aforesaid incurred, and shall moreover be liable for the payment of all damages which may be occasioned by such violation: and every lock keeper who shall violate either of the provisions of the five preceding sections shall forfeit the sum of ten dollars for every such violation.

Sec. 17. Every person who shall wilfully or through gross negligence, obstruct the navigation of either of the Canals of this State, by the improper moving, management, or conduct of any boat or floating thing, shall, for every such offence, forfeit the sum of ten dollars.

Sec. 18. Every person who shall wilfully or through gross negligence, obstruct the navigation of either of the Canals of this State, by sinking any vessel, timber, stone, earth, or other thing, in any part thereof, or by placing any obstruction on the towing path thereof, or on the bank opposite to the towing path, shall forfeit the sum of twenty dollars.

Sec. 19. Every person who shall incur a penalty under either of the two next preceding sections, by committing any offence therein specified, shall moreover be liable to the State and to every person injured thereby, for the payment of all damages which shall accrue in consequence of such offence.

Sec. 20. It shall be the duty of every Engineer, Collector, Superintendent, or Agent, employed on either of the Canals, to seize all boats, rafts, logs, and every floating or sunken thing, which may be found in either of said Canals, and all articles found on the towing path thereof, not under the charge of any person, and to sell the same at public vendue, after giving ten days previous notice thereof, in writing, posted up in two public places near the place where such boat or other articles or thing may be found.

Sec. 21. If the owner of any article so seized, shall appear and claim the same before the time of sale, and pay the cost of seizure and expense of removal, such sale shall not take place.

Sec. 22. If the officer making such sale shall not be a collector, the avails of such sale shall be accounted for by him to the nearest collector, who shall account for the same, as for tolls collected; and if the sale be made by a collector, he shall account for the avails thereof in the same manner.

Sec. 23. After any such sale shall have been made, and the proceeds thereof shall be in the hands of the collector or officer making such sale, such collector or other officer may, on the application of the owner, and due proof of ownership, pay over such proceeds to such owner, after deducting all penalties, forfeitures, costs, and reasonable expenses chargeable thereon.

Sec. 24. The Board of Canal Commissioners, until otherwise provided by law, shall appoint so many collectors of Canal tolls on each of the Canals of this State, as they shall deem necessary for the punctual collection of tolls on such Canals; shall require each collector to give bond with sufficient secu-

rities, for the faithful performance of his duties, in such sum as the Board shall prescribe; shall designate the place where the office of each collector shall be kept; and shall determine what reasonable salary or other allowance shall be received by each collector for his services.

Sec. 25. Collectors of Canal tolls shall be appointed for such term as the Board of Canal Commissioners shall deem expedient, not exceeding three years; but any collector shall be subject to be removed at any time during the period for which he shall have been appointed, for malfeasance in office, or for neglect of duty, whenever the President of the Board of Canal Commissioners, together with the Acting Commissioner having charge of that part of the Canal on which the office of such collector is situated, shall believe the public interest requires such removal, or when the provisions of the law shall require the same.

Sec. 26. In case of the removal of any collector, as provided in the preceding section, the President of the Board and Acting Canal Commissioner by whom such removal shall have been made, may appoint some other suitable person to such vacant office, who shall hold such appointment until the end of the next meeting of the Board, unless removed as hereinbefore provided.

Sec. 27. Any clerk duly authorized by a collector, may, in the absence of the collector, perform all the duties, and exercise all the powers, legally appertaining to such collector; and the collector shall be responsible for the acts of such clerk.

Sec. 28. Collectors may be authorized to refund tolls or penalties, erroneously paid to them, or which equitably ought to be refunded, under such regulations as shall be prescribed by the Board of Canal Commissioners; which regulations shall not be inconsistent with the constitution and laws of this State.

Sec. 29. The owner or owners of every boat navigating either of the Canals, shall subscribe and deliver to the collector of whom the first clearance for such boat shall be demanded, a certificate, to be entitled a "certificate of registry," containing the name or names of such owners, and their respective places of abode, and also the name of the boat, and of some place as that where it is owned: if the owners shall reside out of this State, the certificate of registry shall be signed and delivered by the master of the boat, as the owner thereof.

Sec. 30. If the master of the boat of which the owners reside out of the State, shall be changed after he shall have delivered such certificate, the new master shall sign and deliver a proper certificate of registry, to the collector of whom he shall first require a clearance.

Sec. 31. Every collector receiving a certificate of registry shall sign and deliver to the person of whom he shall receive the same as aforesaid, a written receipt therefor; and shall without delay record the same in a book to be provided and kept by him for that purpose, which book of registry shall be open to inspection during usual office hours: and the name of no registered boat shall be changed without the written order of the collector, in whose office the same is registered.

Sec. 32. Each collector shall, within one month from the time any boat shall have been registered, or change made in the registry in his office, transmit to each of the other collectors on the same Canal, a certified copy of the register of boats in his office, and of the several changes made therein.

Sec. 33. If any persons residing within this State, claiming to be owners of a registered boat, by transfer from its former owners, shall produce to the collector in whose office the same shall have been registered, due proof of such transfer, and shall deliver him a new certificate of registry signed by them.

selves, it shall be the duty of such collector to change the register of such boat, so as to correspond with such new certificate.

Sec. 34. No clearance shall be granted to any boat unless the collector of whom it is required, shall have evidence that such boat is duly registered, or, if it be not registered, until the master thereof shall have delivered to such collector a proper certificate of registry, or have exhibited to him the receipt of some other collector for such certificate.

Sec. 35. The persons specified in the certificate of registry of any boat, as the owners thereof, shall be deemed in law the true owners thereof, for all purposes of enforcing the collection of tolls, and the execution of the laws, rules and regulations for the navigation or maintenance of the Canals.

Sec. 36. Every owner of a boat, who shall change its name from that stated in the certificate of registry then in force, without the written order of the collector in whose office the same shall have been registered; which written order the collector is required to grant, on the application of any owner for that purpose; and every master who shall enter or report such boat, at any collector's office, by a different name from that so stated; shall, for every such offence, forfeit the sum of twenty dollars.

Sec. 37. No boat shall receive a clearance, or be permitted to pass on either of the Canals, unless such boat shall have the name thereof, and the name of the place where it is owned, corresponding with its certificate of registry then in force, painted in some conspicuous and permanent part of the outside of the boat, in letters of at least four inches in height.

Sec. 38. No boat or float shall be permitted to pass on either of the Canals, unless the master thereof shall first have obtained a clearance therefor, for each voyage of such boat or float, from the proper collector of tolls on such Canals; except in the cases hereinafter particularly specified.

Sec. 39. Clearances for every voyage shall be required of, and issued by the collector whose office shall be kept nearest to the place at which the voyage is commenced: *Provided*, That there be any collector's office within one mile of such place.

Sec. 40. If there be no collector's office within one mile of the place from whence the voyage is commenced, the clearance for such voyage shall be required of the collector at whose office the boat shall first arrive in the course of the voyage; and such boat shall be permitted to proceed from the place where the voyage was commenced to such collector's office, and no further, without a clearance.

Sec. 41. The full amount of tolls chargeable on each and every article of property which shall be on board of any boat, or constitute any float, or be on board thereof, at the time such boat or float shall depart from the port or place in which there is a collector from whom a clearance is required, shall be paid to such collector before he shall issue a clearance for such boat or float.

Sec. 42. Every master of a boat or float conveying property on either of the Canals, shall exhibit to the several collectors hereinafter mentioned, a just and true account, or bill of lading, of such property, signed by himself and by the consignor thereof, and containing, first, the name of each place on the Canal where any portion of such property was shipped, and the place for which it is intended to be cleared, specifying the portion shipped at each of such places, and the portion intended to be cleared to each place; second, a statement of the weight of all articles of such property on which toll is to be charged by the ton, of the number of articles on which toll is charged by the number, and of the feet of each article on which toll is charged by the foot; third, a specification of the weight or quantity of each article or articles, on which one rate of toll is charged, and which is to be transported to one place,

separately from other articles on which a different rate of toll is charged, or which is to be transported to a different place.

Sec. 43. Every such account or bill of lading shall be exhibited: first, to every collector of whom a clearance shall be required; second, to every collector whose office shall be next in order in the course of the voyage, to the place where the clearance shall have been granted; third, to every collector at a place where any portion of the cargo shall be unladen, or any additional cargo received; and if there be no collector at such place, to the collector whose office shall be next in order in the course of the voyage; fourth, to every other collector who shall demand such account or bill of lading to be exhibited.

Sec. 44. If any property shall be received on board of any boat or other float, for the purpose of being transported on either of the Canals, during any voyage after such boat or float shall have left the place at which a clearance for the voyage was granted, an account or bill of lading thereof, conforming to all the requisitions herein before stated, shall be exhibited to the collector whose office shall be next in order in the course of the voyage, to the place where such property was received on board, to whom the full amount of tolls chargeable on such property shall be paid; and such boat or float shall not be permitted to proceed on such voyage, beyond the office at which the tolls on such property so received on board, is payable, until the full amount of such tolls are paid.

Sec. 45. When any cargo shall be taken on board of any boat or float, after such boat or float shall have left the place where a clearance was granted, as specified in the preceding section, the account or bill of lading of such property shall be exhibited to the collector whose office shall be next in order in the course of the voyage, to the office at which the tolls on such additional cargo are required to be paid, and to every other collector who shall demand it to be exhibited.

Sec. 46. If there be no collector's office within one mile of the place where a voyage on the Canal shall be commenced, nor within one mile of the place where the same shall terminate, nor at any intermediate place, the master of the boat or other float, shall, within ten days after the termination of such voyage, exhibit a true account thereof, and a bill of the lading transported on board of such boat or float at any time during such voyage, to the collector whose office shall be nearest to the place where such voyage terminated, and shall pay to such collector the tolls due on such boat or float and lading; and every master who shall neglect to exhibit such account and bill, and to pay such tolls, within the period above limited, shall, for every such offence, forfeit the sum of twenty-five dollars.

Sec. 47. Every master of a boat or other float navigating either of the Canals, who shall omit to exhibit or deliver a true bill of lading to any collector or to pay the tolls thereon when required, or shall deliver any article mentioned in a bill of lading at a place beyond that to which such article shall have been cleared, shall forfeit the sum of twenty-five dollars.

Sec. 48. Every person who shall sign or deliver to any collector a false bill of lading, shall pay on all property omitted in such false bill, treble the established rates of toll chargeable thereon, to any collector who shall be satisfied of such omission, for the whole distance such property is conveyed on the Canal.

Sec. 49. Every person who shall knowingly sign or deliver a false bill of lading, shall be deemed guilty of a misdemeanor; and upon conviction thereof before any Court of competent jurisdiction, shall be fined not less than three times the value of the property omitted or falsely stated in such bill.

Sec. 50. Every collector receiving a bill of lading, may require the mas-

ter exhibiting it to verify it by his oath, which such collector is authorized to administer.

Sec. 51. Each boat navigating the Canals shall have a separate clearance; and no part of the cargo of any boat shall be cleared to a place beyond that to which the boat is cleared.

Sec. 52. No boat or other float shall proceed beyond the place to which it shall be cleared; nor shall any article of its cargo be unladen after its arrival at the place for which such article is cleared, nor proceed beyond such place, until the master thereof shall have delivered the clearance of such boat or float to the collector at the place for which it is cleared, if there be any collector at such place.

Sec. 53. If there be no collector at such place, the master shall deliver the clearance to the last collector whose office shall be passed by the boat in the order of the voyage, and shall receive a permit from such collector, to proceed to the place to which the boat or float is cleared.

Sec. 54. Every master who shall omit to deliver a clearance to the collector to whom the same ought to be delivered, shall forfeit the sum of twenty-five dollars.

Sec. 55. Every collector issuing any clearance, or in whose office any clearance is on file, shall, whenever requested, give a certified copy thereof, with the additional cargo entered thereon, and the several endorsements of other collectors; for which he shall be entitled to demand and receive from the person applying for the same, if such certified copy does not contain over one hundred words, ten cents; and if such copy contains over one hundred words, he shall be entitled to receive pay therefor at the rate of ten cents for every hundred words.

Sec. 56. Such certified copy of any clearance shall have the same validity and effect, as the original clearance of which it is a copy.

Sec. 57. The tonnage of all articles transported on either of the Canals, on which toll may be charged by the ton, shall be ascertained and charged according to the real weight of such articles, reckoning twenty net hundreds to make a ton.

Sec. 58. Whenever a difference shall arise between a collector and the master of any boat or float, as to the amount of tolls chargeable on the lading of such boat or float, the collector shall detain the boat or float and the articles on which toll is to be charged, and shall weigh, count or measure the articles, as the case may require; and if it shall be ascertained that the weight, number or feet exceeds the amount stated in the bill of lading thereof, the collector shall charge tolls according to the weight, number or feet thus found; and the master shall pay to the collector the expense of such weighing, counting or measuring; and such expense shall be chargeable on such articles, or on the boat or float containing them.

Sec. 59. The master of every boat or float shall be liable for the payment of tolls and expenses chargeable on such boat or float and its cargo; and it shall be the duty of every collector to detain all articles on which tolls or expenses are chargeable, and the boat or float containing them, until such tolls and expenses shall be paid.

Sec. 60. If such payment be refused, the collector shall, in the name and on behalf of the State of Ohio, distrain so much of the property detained as shall be sufficient to satisfy the charges thereon; and at the expiration of ten days, if such charges shall remain unpaid, he shall expose to sale, at public auction, the property distrained, at his usual place of receiving tolls, and sell the same to the highest bidder, between the hours of ten o'clock, A. M. and four o'clock, P. M. having first given two days notice of such sale, and a description of the property to be sold, by advertisement posted up in three

of the most public places in the township in which said collector's office is situated.

Sec. 61. Any surplus avails of such sale, after the payment of the sum chargeable thereon, including costs of distress and sale, shall be paid on demand to the master of the boat, or float, or to the owner of the property distrained.

Sec. 62. Every master of a boat shall make out and certify a correct list for every voyage of all passengers over twelve years of age, which are transported on board of such boat for any distance during such voyage, stating therein the name of each passenger, and the distance such passenger is transported, and deliver said list to the collector to whom the clearance of the boat for such voyage is to be delivered, and shall pay to such collector for each passenger five mills for every mile such passenger shall have been transported.

Sec. 63. Such list of passengers, shall at all times during such voyage, exhibit the names of all passengers then on board of the boat, and the distance which each has been transported, or which each is to be transported, and shall be examined by the several collectors to whom the master of the boat is required to exhibit his clearance.

Sec. 64. Every master of a boat who shall omit in any respect to comply with the requisitions of the two preceding sections, shall, for every such omission, forfeit and pay the sum of ten dollars, in addition to the tolls omitted to be certified; and the boat, and the owners thereof, shall severally be held liable for the payment of all such tolls and penalties.

Sec. 65. Every penalty and forfeiture prescribed by this act, and for which any owner, master, boatman, navigator, or other person having charge of any boat or float, or assisting in the management thereof, when such penalty or forfeiture is incurred, shall be chargeable on such boat or float; and a suit in the name, and on behalf of the State of Ohio, for the recovery thereof, may be brought by any collector, superintendent, Acting Commissioner, or Engineer, before any Justice of the Peace within the county where such penalty or forfeiture was incurred, or before any other Court of competent jurisdiction, against any person being in the possession or having charge of such boat or float, at the time such suit is commenced.

Sec. 66. When any suit shall be prosecuted for any such penalty or forfeiture, the magistrate issuing the process, by a clause to be inserted therein, may direct the officer serving the same, to detain such boat or float, and the furniture and horses belonging thereto, until the suit shall be determined, or until adequate security shall be given for the payment of any judgment that may be recovered.

Sec. 67. If such security shall be given, or the defendant in such suit shall prevail, the magistrate shall order the boat or other float and property detained, to be released; but if no such security be given, and a judgment shall be recovered for such penalty or forfeiture, and the same, together with the costs, shall not be immediately paid, an execution shall be forthwith issued, under which the property so detained may be sold, in like manner as if the judgment had been rendered against the owner or owners thereof.

Sec. 68. The term "float," as used in this act, shall be construed to embrace every boat, vessel, raft, or floating thing, navigated or moved on either of the Canals, under the direction of any person or persons having charge thereof; and the term "master," as so used, shall be construed to apply to every person having, for the time, the charge, control, or direction, of any such float.

Sec. 69. The collectors of tolls shall keep accounts of all tolls received by them, in such form as shall be prescribed, from time to time, by the Auditor

of State; and shall deposit the original books of accounts, together with such clearances and other papers as he shall require, in the Auditor's office, on or before the tenth day of December, in each year.

Sec. 70. Each collector shall make abstracts from such books, showing the amount of tolls received by him each day, and transmit the same, by mail, to the Auditor, once in each month, and as often as the Auditor shall require, if he shall think proper to require such abstracts more frequently than once in each month.

Sec. 71. Each collector shall deposit, at least once in each month, to the credit of the Treasurer of State, in such bank as may from time to time be designated by the Treasurer, all moneys received by such collector, for tolls, penalties, and forfeitures, after deducting therefrom such portion of his salary as shall then be due, and such incidental expenses as shall have been allowed by the Auditor; for which, duplicate receipts or certificates of deposit shall be taken, one of which shall, without delay, be transmitted by mail to the Auditor of State, who shall charge the same to the Treasurer, and credit the amount to the Canal Fund.

Sec. 72. If any collector of tolls shall omit to transmit any abstract or certificate of deposit, or to deposit in the office of the Auditor of State, any original book of account, clearance, or other paper, as required by the preceding sections, for the space of one month after the same should have been done, the Auditor shall immediately notify the President of the Board of Canal Commissioners, of such omission, and such collector shall be immediately removed from office; and the Auditor shall immediately cause suit to be instituted against such collector and his sureties, on the bond of such collector.

Sec. 73. If any collector of tolls shall neglect to deposit, according to law and the directions of the Auditor, the moneys that from the abstracts transmitted to the Auditor, shall appear to be due from such collector, the Auditor may issue a warrant under his hand and seal, directed to the Sheriff of any county where such collector or any of his securities may be found, thereby commanding such Sheriff, in the name, and on behalf of the State of Ohio, to cause the amount appearing to be due from such collector, to be levied and made of the goods, chattles, lands and tenements of such collector; and in case the same shall be insufficient, then of the goods and chattles, lands and tenements, of the sureties of such collector; and to return the money, together with the warrant, and his doings thereon, to the Auditor, within sixty days from the date thereof.

Sec. 74. The Sheriff to whom any such warrant shall be directed, shall immediately cause the same to be executed; and may demand and collect the same fees for executing the same, as are allowed by law for the service of executions, issuing from the Courts of Common Pleas of this State.

Sec. 75. That the Auditor of State shall open and keep a correct account with each collector of tolls, in a book to be provided and kept by him for that purpose; and for the purpose of making out such account, shall carefully examine and compare the books, abstracts, and other papers, returned by each collector, and shall also compare the same with the abstracts and papers returned by the other collectors, which may furnish a corresponding account of any items contained in such abstracts.

Sec. 76. That it shall be the duty of the Canal Commissioners to furnish the Auditor with a statement, exhibiting the names of the several collectors of tolls, and of the place where each is to keep his office, the amount allowed to each collector for his salary, office rent, or any other allowance authorized by the Board, and of all changes from time to time, made in the foregoing particulars; and to deposit in his office all bonds given by collectors, for the pur-

pose of enabling the Auditor to comply with the requisitions of the foregoing sections.

Sec. 77. That if any collector, superintendent, Acting Commissioner, Engineer, or other person, shall commence any suit, or institute any other proceeding under the provisions of this act, and judgment shall be rendered for the defendant, in such suit or other proceeding, or discontinued without the consent of the parties, such collector, superintendent, Acting Commissioner, Engineer, or other person, commencing such suit or other proceeding, shall be liable to the defendant, or any other person interested therein, for all costs, hindrance, delay, and other damages sustained thereby, to be recovered by action on the case, in any Court of competent jurisdiction, unless the Court or jury, as the case may be, shall be satisfied by evidence produced by the defendant in the action brought for the recovery of such damages, that there was probable cause for commencing and carrying on such former suit or other proceeding.

Sec. 78. That in all prosecutions and proceedings, under this act, it shall be lawful for either party to appeal to the Court of Common Pleas of the proper county, upon the same conditions and in the same manner, as appeals are allowed by law, in civil cases cognizable by Justices of the Peace.

THOMAS L. HAMER,

Speaker of the House of Representatives.

ROBERT LUCAS,

Speaker of the Senate.

February 23d, 1830.

RATES OF TOLL.

At a meeting of the Board of Canal Commissioners, at Columbus, 23d February, 1830:

“Ordered, That the following rates of toll shall be charged and collected, on the Ohio and Miami Canals, from and after the first day of March, 1830:

	<i>C. M.</i>
On all kinds of merchandize, except as hereinafter stated, for the first 100 miles, or any lesser distance, per ton per mile,	4 0
Ditto, for each mile, in addition to 100, per ton per mile,	3 0
On hollow glass-ware, window glass, manufactured tobacco, castings of every description, cordage, nails, dye-stuffs, leather, iron, lead in bars, candles, burblocks, writing and wrapping paper, when transported in lots, unaccompanied by merchandize belonging to the same owners, for the first 100 miles, or any lesser distance, per ton per mile,	2 0
Ditto, for each mile, in addition to 100, per ton per mile,	1 5
On flour, wheat, beans, peas, whisky, all kinds of seeds, salted and fresh provisions, pot and pearl ashes, black salts, beer, porter, cider, lard, butter, cheese, tallow, beeswax, soap, wool, flax, hemp, cotton, leaf tobacco, hides, skins, rags, potter's ware, salt, tar, rosin, household furniture, baggage over 20lbs. for each passenger of 12 years of age or upwards, coopers' ware, carpenters' and joiners' work prepared for building, wagons, ploughs and all other agricultural implements, and on domestic animals for the first 100 miles, or any lesser distance, per ton per mile,	1 5
Ditto for each mile, in addition to 100, per ton per mile,	1 0

On corn, oats, rye, barley and buckwheat, whether ground or unground, and on bran or shorts, per ton per mile, for the first 100 miles, or any lesser distance,	1 0
Ditto, for each mile, in addition to 100, per ton per mile,	0 7
On all mill stones, tomb stones, and other cut stone, grindstones, pig metal, gypsum, clay and lime, for the first 100 miles, or any lesser distance, per ton per mile,	1 0
Ditto, for each mile, in addition to 100, per ton per mile,	0 7
On mineral coal, and iron ore, for the first 100 miles, or any lesser distance, per ton per mile,	0 5
Ditto, for each mile, in addition to 100, per ton per mile,	0 3
On bricks for any distance, per thousand per mile,	1 0
On stone for building, and stone for lime, and other rough stone, per perch per mile,	0 5
On staves and heading, for the first 100 miles, or any lesser distance, per ton per mile,	0 5
Ditto, for each mile, in addition to 100, per ton per mile,	0 3
On boards, plank, scantling, and other sawed stuffs, (reduced to inch board superficial measure,) for the first 100 miles, or any lesser distance, per 1000 feet per mile,	1 0
Ditto, for each mile, in addition to 100, per 1000 feet per mile,	0 5
On timber squared or round, if transported in boats, for any distance, per 100 cubic feet, per mile,	1 0
On square timber, when transported in rafts, per 100 feet, per mile,	3 0
On shingles and laths, per 1000 per mile,	0 2
On posts and rails, for fencing, per 1000 per mile,	2 0
On wood for fuel, and tanners' bark, per cord per mile,	1 0
On charcoal, hay, straw, and vegetables, for any distance, per ton per mile,	1 0
On all articles not enumerated, per ton per mile,	3 0
On boats used chiefly for freight, per mile,	2 0
On each passenger, conveyed in any boat, per mile,	0 5
The ton shall be computed by the net hundred."	

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ERRATA.

Last line of page 143, for \$169,000, read \$168,000. Page 272, seven-
teenth line from bottom, for 17th Jan. 1827, read 17th Jan. 1828. Page 292,
in the date of Report, for Jan. 5th, 1828, read Jan. 17th, 1828.

Erase the article on 102-3-4 pages, headed, Extract, &c. 5th Jan. 1825.

Name	Age
John Smith	25
Mary Jones	22
James Brown	20
Elizabeth White	18
Robert Green	16
Sarah Black	14
William Grey	12
Anna Hall	10
Thomas King	8
Margaret Lee	6
George Clark	4
Helen Adams	2
Charles Baker	1
Elizabeth Miller	0
John Davis	0

The above is a list of the names of the children of the
 members of the church, as reported by the
 parents, for the year 1871.











